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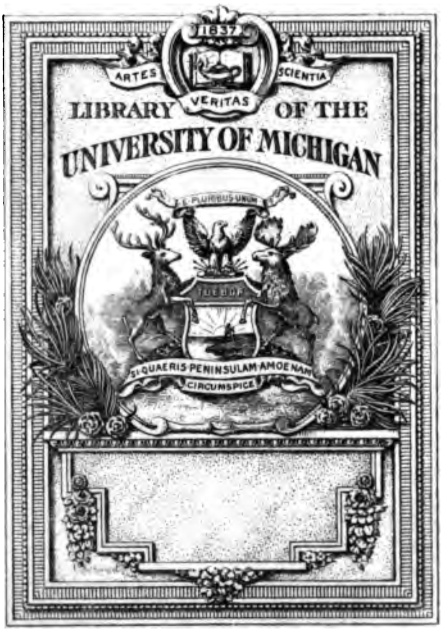

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GEOLOGICAL SURVEY OF PENNSYLVANIA, REPORT P 4, 1889.

A DICTIONARY

OF THE

FOSSILS OF PENNSYLVANIA

AND NEIGHBORING STATES

NAMED IN THE

REPORTS AND CATALOGUES OF THE SURVEY.

Compiled for the convenience of the citizens of the State
BY J. P. LESLEY, STATE GEOLOGIST.

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VOL. 2.

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1889.

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DICTIONARY

OF

FOSSILS FOUND IN PENNSYLVANIA

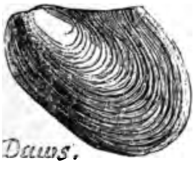
AND ELSEWHERE.

VOLUME 2.

Naiadites, Dawson's name to include the lamellibranch *Modiolas*, *Unios*, *Anodons*, of other authors. Seven of these occurring in the Coal Measures of Nova Scotia, he names *N.* (*Anthracoptera*) *carbonaria*, f. 42; *N.* (*Anthracomya*) *elongata*, f. 43; *N.* (*Anthracoptera*) *lævis*, f. 44; *N. arenacea*, f. 45; *N. ovalis*; *N. angulata*, f. 46; *N. obtusa*; Salter giving them the names in parenthesis. Gümbel and Geinitz say *Dreissena carbonaria*. King's *Anthracosia* occurs in Nova Scotia only in the Lower Coal of Baddeck, C. B. *Naiadites* have both thick and thin shells; an external ligament; no teeth; have not been found in strictly marine limestones, nor in company with proper marine shells, and were probably attached by a byssus to sunken or floating timber; probably were all brackish or fresh water shells, like the *Mytilidæ* and embryonic *Unionidæ*. Dawson's Acad. Geol. 1868, p. 204.

XI. XIII.

Fig. 42.



Daws.

Fig. 43.

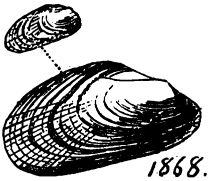
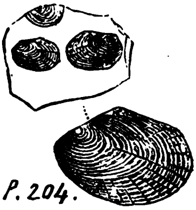


Fig. 44.



1868. P. 204.

Fig. 45.

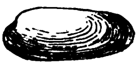
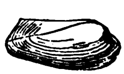
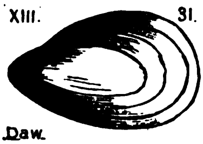


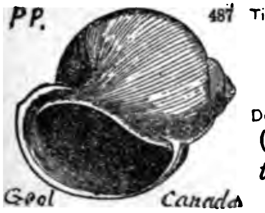
Fig. 46.





Naiadites (*Acanthoptera*) **carbonaria,** Dawson, Acadian Geology, 1868, fig. 31, a specimen in the usual flattened and distorted condition in which these shells are found in the bituminous shale in the coal measures of the Joggins section, so that it is very difficult to find one sufficiently perfect to be described. It is the most abundant of any of the shells in the Joggins Coal Measures, beds of some thickness being often almost entirely made up of the valves. (Dawson.)—*XIII.*

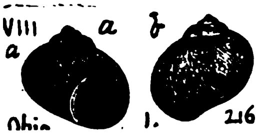
Natica carleyana. See **Naticopsis carleyana.** *XI.*



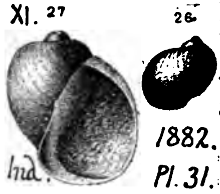
Natica clausa, Sowerby. Dawson's Acadian Geology, 1868, page 74, fig. 18; over boulder clay, St. John.—Geology of Canada, 1863, page 964, figure 487. *Champlain clay* (*Quaternary*, or *latest glacial*) *formation.—PP.*

Natica groenlandica, Müller. Geology of Canada, 1863, page 964, fig. 488. (The accompanying figure 489 is of *Natica helicoides*, see below.) *Champlain clay* (*latest glacial*) *formation.—PP.*

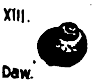
Natica helicoides, Johnston. Geol. Can. 1863, page 964, fig. 489, for which see under *Natica groenlandica*, above.—*Champlain clay* (*latest glacial*) formation—*PP.*



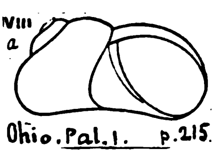
Naticopsis æquistriata, Meek. Pal. Ohio, Vol. 1, page 216, wood-cut fig. *a*, *magnified* × *3*; *b*, back of same, striæ a little too fine for the scale of enlargement. Possibly some European *Naticas* may be *Naticopses*; also some American Silurian *Holopeæ* of which only casts are found. (Foot note by Meek.) Easily distinguished from the young of *Naticopsis levis* by its gracefully curved striæ, narrower columella, and thin inner lip. (like *Platyostoma.*) Franklin Co., O. *Corniferous*, *VIII a.*



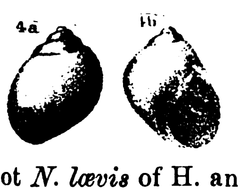
Naticopsis carleyana, (*Natica carleyana*, Hall, Trans. Alb. Inst. Vol. 4, 1856.)—Whitfield, Bull. 3, Amer. Mus. Nat. Hist. 1882, p. 71, plate 8, figs 26, 27. —Collett's Ind. Report 1882, page 369, plate 31, fig. 26, *natural size*, back view; fig. 27, *magnified twice*, mouth of shell. It is not a Natica because it has no navel (umbilicus). Its appearance is different from all other shells of *XI;* often worn smooth; striæ gone.—Alton, Spergen Hill, &c. Ind. *Subcarboniferous. XI.*



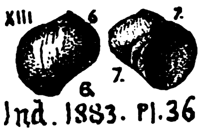
Naticopsis howi, Hartt. Dawson's Acad. Geol. 1868, p. 309, fig. 119; allied to *N. pliciatria*, but with delicate lines of growth on the whorls, and always small. Found at several places in Nova Scotia, in *Carboniferous limestone. XIII?*



Naticopsis ? (*Isonema*) humilis, Meek, Proc. Acad. Nat. Sci. Phila., 1871, *Corniferous.*—Pal. Ohio, Vol. 1, page 215, wood-cut outline of Hall & Whitfield's *N. levis.* (See Desor, New Sp. Devonian Foss. from Iowa, pl. 12. fig. 3.—Meek). Looks as if it might be the full grown or adult form of *Isonema depressa*, M. and W., but it has no more volutions, even when ten times as large; and differs in being less depressed, with rounder and fuller whorls, and a less strongly and regularly striated surface.— *VIII a.*

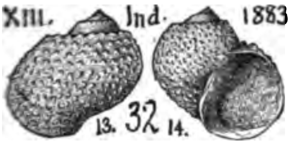


Naticopsis lævis, (or *levis*), Meek, Pal. Ohio, Vol. 1, 1873, page 215, plate 19, fig. 4 *a*, *natural size*, dorsal side view; 4 *b*, opposite side and mouth of shell. Franklin Co., O. *Corniferous limestone, VIII a.* — This is Meek's *N. levis* of Proc. A. N. S. 1871, not *N. lævis* of H. and W. 1872.

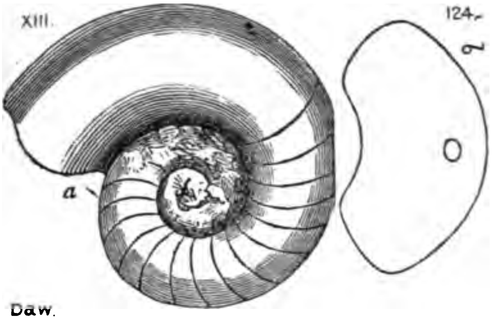


Naticopsis nana, (Meek & Worthen, Illinois Geol. Rt. 1866, Vol. 2, plate 31). Collett's Indiana Report of 1883, page 162, plate 36, figs. 6, 7, *enlarged to about twice*, opposite sides of same specimen. *Middle and Upper Coal* from Indiana to Nevada. *XIII, XV.*

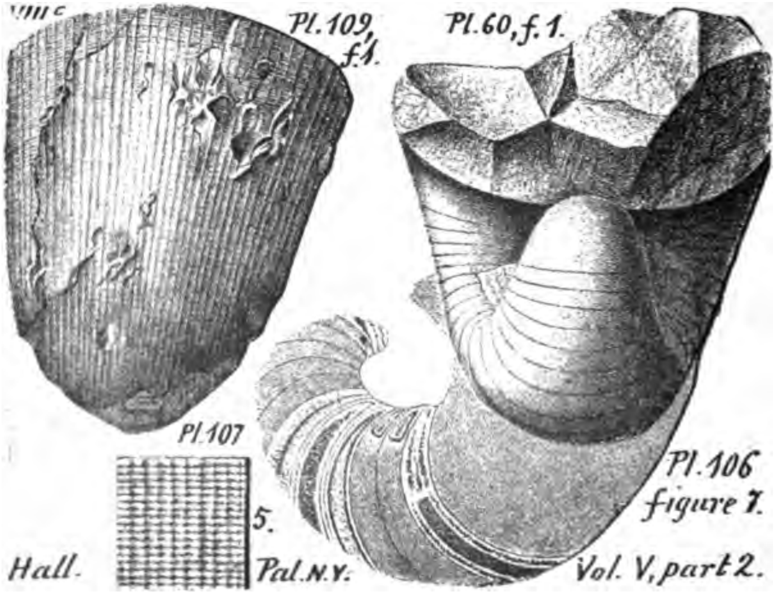
Naticopsis wheeleri, (*Littorina wheeleri*, Swallow, Trans. St. Louis Acad. Sci. Vol. 1, 1860). Meek & Worthen, Illinois Report of 1873, Vol. 5, page 955.—Collett's Indiana Report of 1883, page 162, plate 32, figs. 13, 14, ***natural size***, Large specimen. Well marked species. *Upper Coal Measures* from Indiana to New Mexico. *XV.*



Nautilus avonensis, Dawson, Acad. Geol. 1868. p. 310, f. 124, *a*, shell of small size; *b*, cross section; sometimes the outer chamber is more than 2 in. in diameter; septa convex, ⅛ in. apart; belongs to genus ***Cryptoceras*** D'Orb. Abundant at Windsor, N. S., in *Carboniferous limestone*, *XIII?*

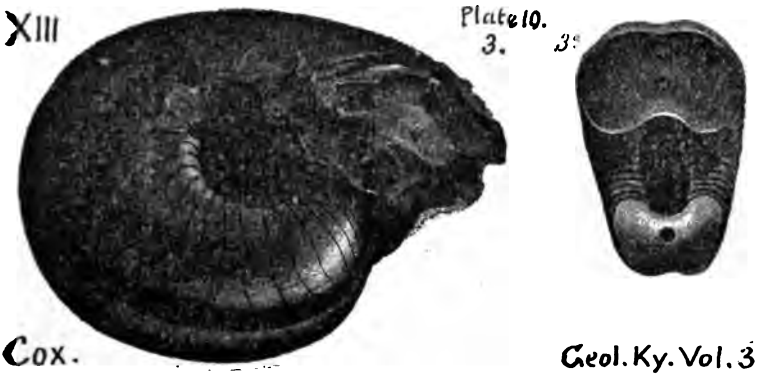


Nautilus buccinum, Hall. (See *Gyroceras expansum*).

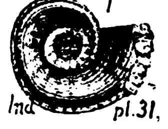

VIII c
Pl. 109, f. 1.
Pl. 60, f. 1.
Pl. 107
5.
Pl. 106 figure 7.
Hall.
Pal. N. Y.
Vol. V, part 2.

Illust. Dev. Foss. 1876; Pal. N. Y. Vol. 5 ii, 1879, page 412, plate 60, fig. 1, back side of very good example; 106, 7, section of a small specimen showing the relation of a large inhabited chamber to the small air chambers; 107. f. 5, *enlarged* surface markings; 109, 1, belly view of grand chamber of young specimen, with wonderfully perfect surface ornamentation. (The sharp ridges crossed by fine striæ, are exactly like those of specimens from the *Goniatite limestone*) *Hamilton.*— In Pennsylvania recognized by Claypole & White in Huntingdon Co. (T3, p. 109) in *Hamilton upper shale. VIII c.*

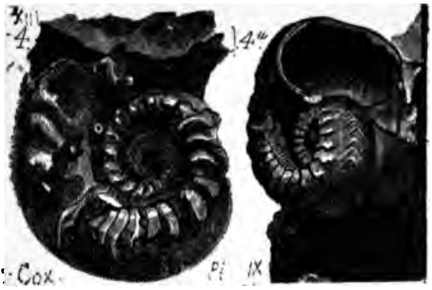
Nautilus canaliculatus, Cox. Geol. Sur. Ky., Vol. 3, 1857, page 575, plate 10, fig. 3, *natural size;* 3 *a*, section of a smaller specimen. Abundant with *Goniatites nolinensis* and *Nautilus ferratus*, at Nolin Iron Works, Edmonson county, Ky.. in a thin stratum of fire-clay with plants, 100′ above the conglomerate. *XIII.*



Nautilus clarkanus. (Hall, Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3, Am. Mus. Nat. Hist. plate 8, fig. 1, 1882). Collett's Indiana Report of 1882, page 373, plate 31, fig. 1. All the specimens are somewhat worn; fine scratches on the side edge of the shell gone. Spergen Hill and Lanesville, Ind. *Sub-carboniferous limestone. XI.*

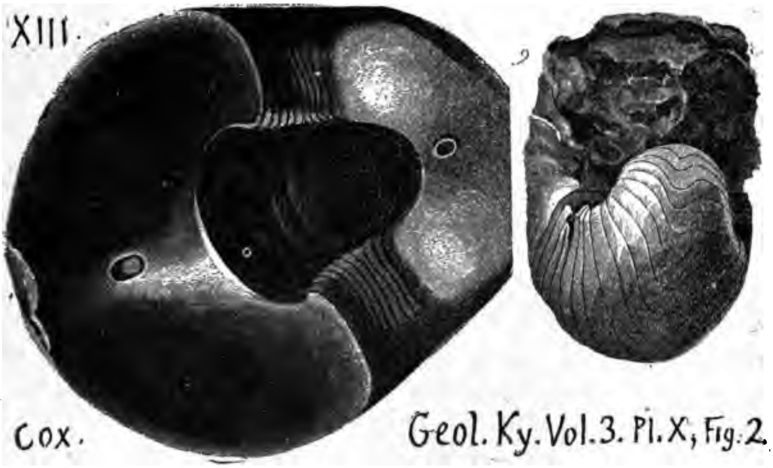


Nautilus docoratus. (Somewhat like *Nautilus tuberculatus.*) Roger's Geology of Pennsylvania, 1858, p. 833. fig. 692, *Coal Measures.* Also, Kentucky survey, Vol. 3, 1857, page 572. plate 9, figs. 4. 4 *a*, *natural size.* Found crushed in

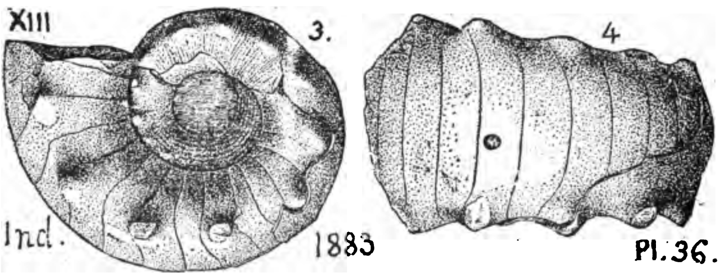


roof shales of No. 9 coal, Ky. C. Co. Union Co.; and more perfect in calc. pyritous nodules, which decompose and leave the fossil exposed. *XIII.*

Nautilus ferratus, Cox, Geol. Sur. Ky., Vol. 3, 1857, page 574, plate 10, fig. 2, *half size;* 2 *a*, section *natural size.* Found at the Nolin Iron Works, Edmonson Co., Ky., in a thin layer of fire-clay 100′ above the *Conglomerate.*—*XIII.*

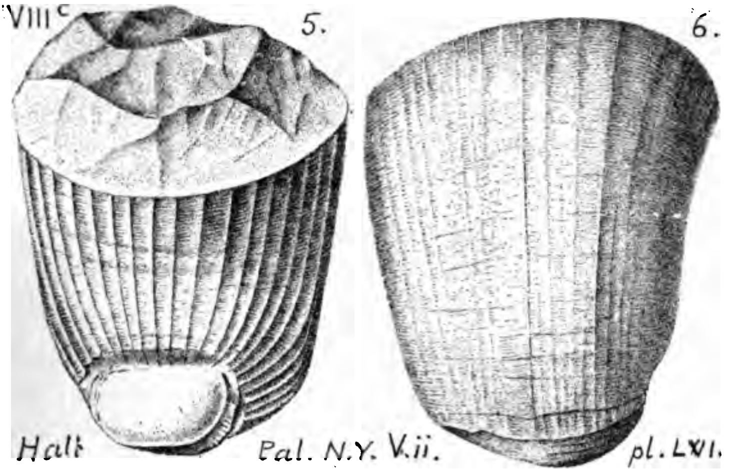

XIII
Cox.
Geol. Ky. Vol.3. Pl. X, Fig. 2.

Nautilus forbesianus, McChesney, Trans. Chicago Acad.

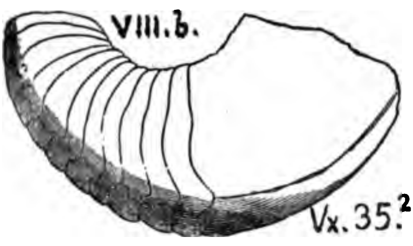


Sci. Vol. 1, plate 3, fig. 4.—Collett's Indiana Report, 1883, page 165, plate 36, figs. 3, 4, *natural size;* only the inner whorls, so that the complete size of the shell is not known. This is the *Nautilus decoratus* of Cox's Kentucky survey (Collett's note). Mercer Co. Ill. and Newport, Ind. *Coal Measures.* *XIII.*

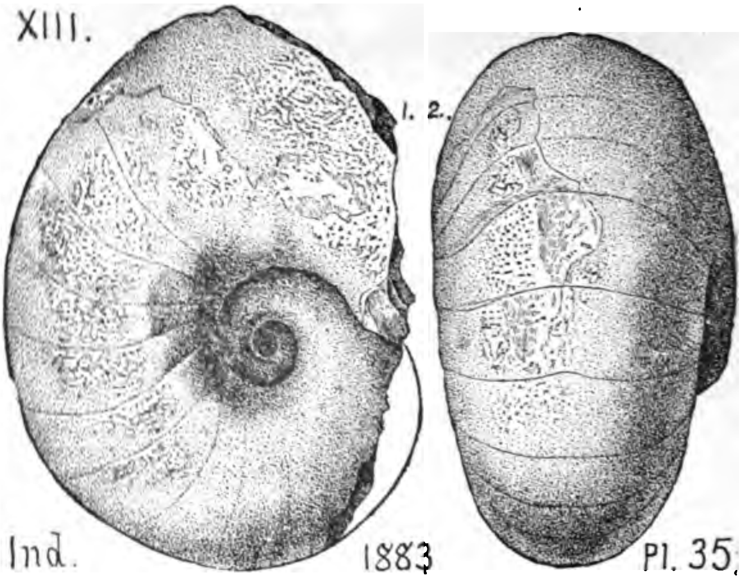
Nautilus liratus *var.* **juvenis,** Hall, Pal. N. Y., Vol. 5, part 2, plate 56, figs. 5, 6. Found by Fellows, on Marshall's creek, Monroe Co., Pa. Cat. OO. p. 235, spec. 807–21. *Hamilton strata.* *VIII c.*


VIII c
5.
6.
Hall Pal. N.Y. V.ii. pl. LVI.

Nautilus marcellensis (*Goniatites marcellensis.* Vanuxem, page 146, fig. 35, 2. *Marcellus formation.*)—Abounds in bed No. 8 of the McConnellstown section, Huntingdon Co. Pa. in the dark shale ten feet below the top of the Marcellus, near Heffner's mill, T3, p. 198. *VIII b.*—In Columbia Co., Pa., it is seen on West Briar creek, under the Chemung strata, in *Genesee black shale.* (G7, p. 76, 205).—*VIII e.*



Nautilus missouriensis. (Swallow? Trans. St. Louis Acad. Sci. 1857, p. 198; incomplete description from small specimen, or from inner whorl.) Collett's Indiana Rt. 1883,



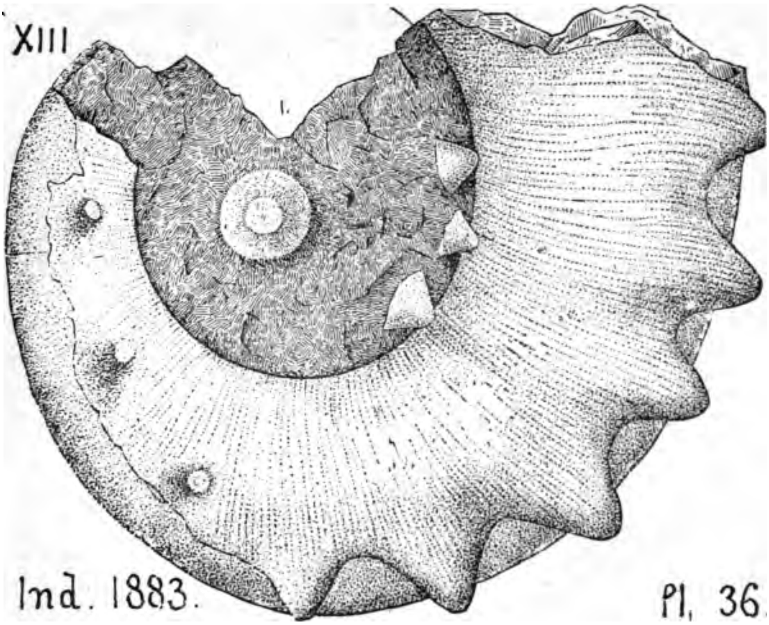
p. 166, plate 35, figs. 1, 2, *natural size*, incomplete cast; closely related to *Nautilus spectabilis* of Meek & Worthen, Illinois Rt. Vol. 2, plate 25, from the *Chester limestone* (*XI*), the only reason for supposing it a different species. *Coal Measures*, Fountain Co., Ind.—*XIII.*

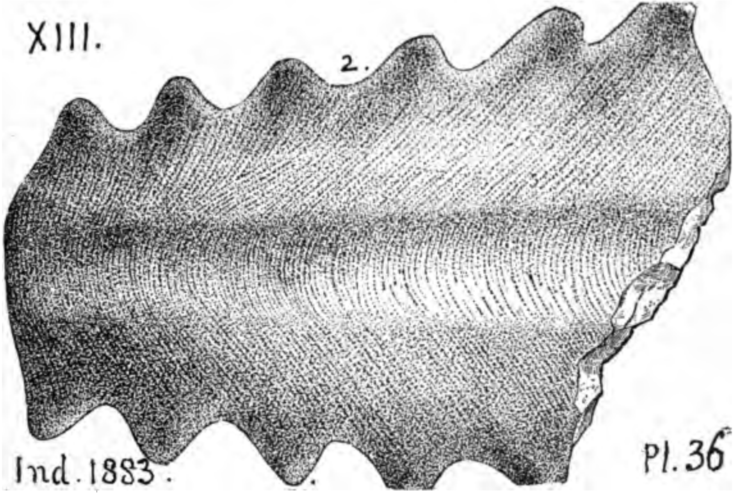
Nautilus occidentalis, Swallow, Trans. St. Louis Acad. Sci. 1858, in so called *Permian*, or *Permo-Carboniferous strata*, *XVII.* In the Pennsylvania coal measures (KKK, p. 310) it occurs much earlier: first, in the *Lower Productive* (*Allegheny river series*) in Beaver, Lawrence, Mercer and Butler Cos. (Q, 62, 200; Q2, p. 47; Q4, p. 25; V, p. 147); then, in the *Pine creek and Brush creek limestones*, at Smith's ferry, etc. (Q. 33, 34, 264); then, in the *Crinoidal limestone* of the *Barren* (*Pittsburgh*) *series*, 250′ under the Pittsburgh coal bed (L, 36; K, 80).—*XIII, XIV.—See Appendix.*

Nautilus spectabilis, near *N. missouriensis*. *XIII.*

Nautilus winslovi. (*Temnocheilus winslovi*, Meek & Worthen Illinois Rt. 5, 1873, plate 32). Collett's Indiana Rt. 1882, page 165, plate 36, figs. 1, 2, *reduced to about 5·6* of the type specimen, from Danville, Ill. About M, or N, of the Indiana coal beds. *XIII.* (*For figure, see p. 447.*)

Nautilus winslovi, *continued. See p. 446.*





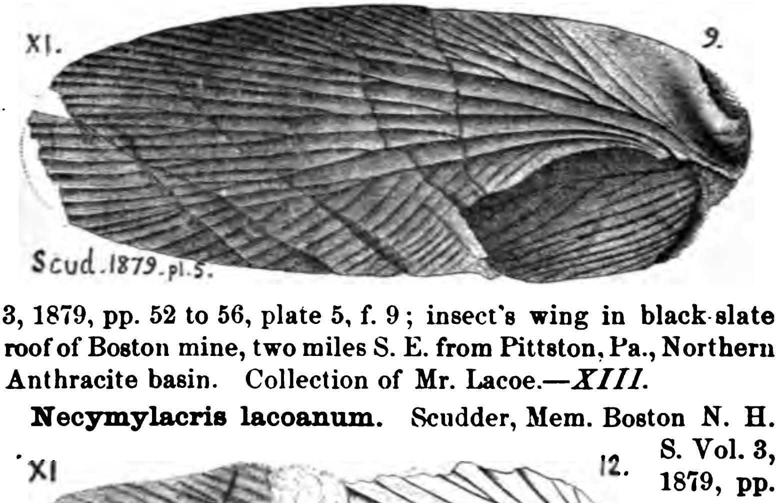
Nautilus —— ? at Morgantown and Greene Co., Pa., in the *Decker's creek shale*, under the Mahoning sandstone. J. J. Stevenson, L, p. 37. *XIII.*

Nautilus —— ? unknown; several ill-defined casts and impressions found by Heilprin in collection of Mill creek lime stone fossils in Mus. Wyoming Hist. Soc. Wilkesbarre, Pa., Geol. Sur. An. Rt. 1885, p. 457.—*XIV.* Coal measures, 1,000' above Pottsville conglomerate.

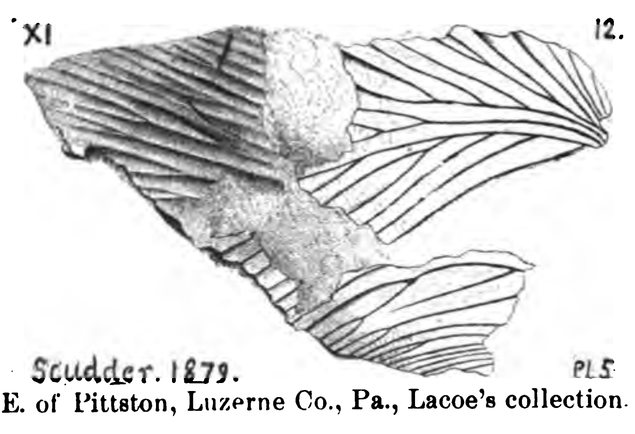
Nautilus ——— probably a new species, collected by I. C. White on Trough run, Beaver Co., Pa., in the *Ferriferous limestone* (Q, p. 200). *XIII.*

Nautilus ——— probably a new species, collected by I. C. White, in Beaver Co., Pa., at Taylor's and Jackson's, from the *Mercer upper limestone ;* and in Lawrence Co., on Hickory creek, from the *Mercer lower limestone.* *XII.*

Necymylacris heros. Scudder, Mem. Bost. S. N. H. Vol. 3, 1879, pp. 52 to 56, plate 5, f. 9; insect's wing in black-slate roof of Boston mine, two miles S. E. from Pittston, Pa., Northern Anthracite basin. Collection of Mr. Lacoe.—*XIII.*



Necymylacris lacoanum. Scudder, Mem. Boston N. H. S. Vol. 3, 1879, pp. 53, 54, pl. 5, fig. 12, insect wing found in black shale roof of Boston mine, two miles S. E. of Pittston, Luzerne Co., Pa., Lacoe's collection. *XIII.*



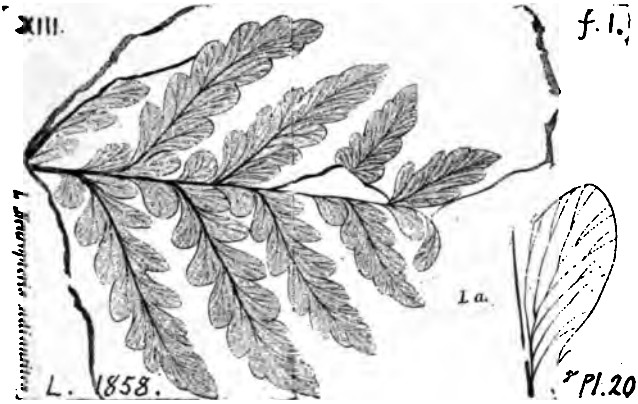
Neorthroblattina rotundatum. Scudder. A very small cockroach wing from the Trias of Colorado. Zittel's Handbook of Palæontology, Vol. 2, 1885, p. 766, fig. 960, *enlarged five to two.* Given to show what kind of insect life may be found in our New Red shales of southeastern Pennsylvania. (See **Mormolucoides articulatus.** Hitchcock.) — *Trias formation.*

Zit. Fig. 960.

Neriopteris lanceolata, Newberry, Pal. Ohio, Vol. 1, 1873, page 381, plate 45, fig. 1, upper part of frond; 2, middle portion of frond; 3, *natural size*, single pinnule; 3 *a*, portion of same *enlarged* to show nervation. *Figure on p. 450.*

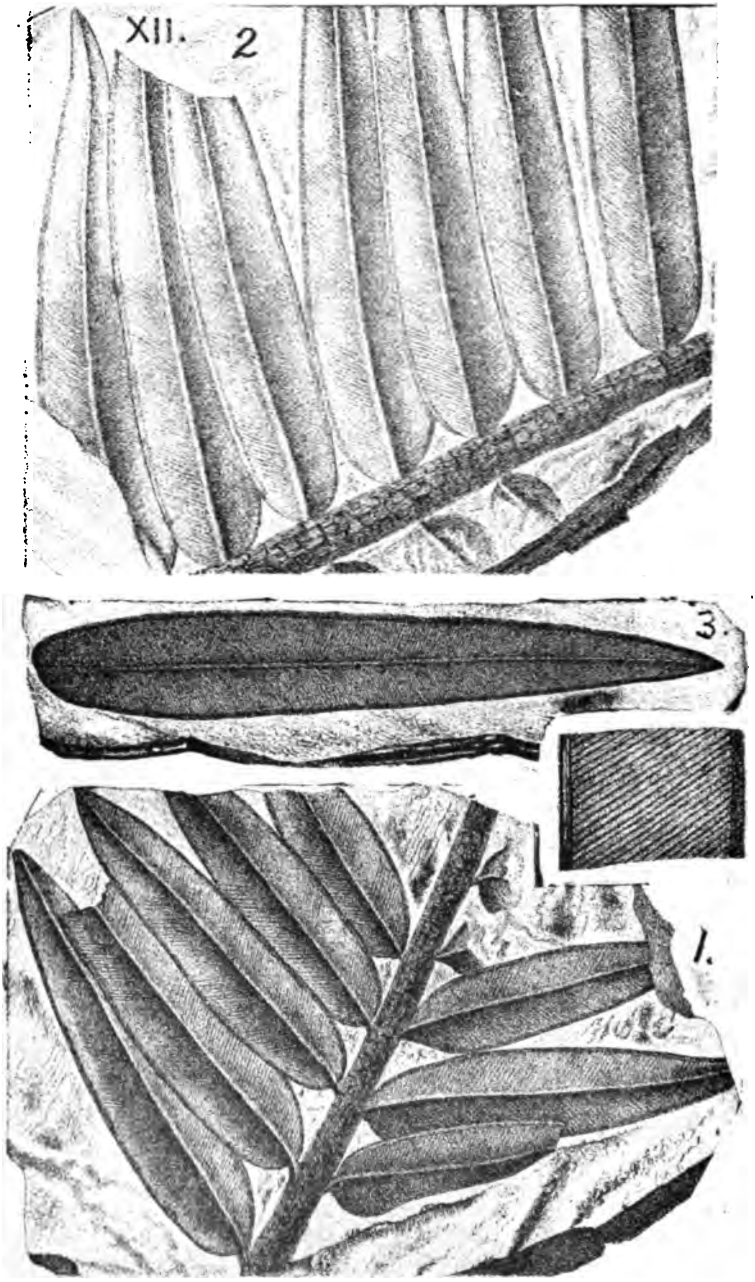
Neuropteris acutifolia? English. See **N. angustifolia.**

Neuropteris adiantites. (See **Lesquropteris adiantites.**) Lesq. Geol. Pa. 1858, Vol. 2, p. 850, pl. 20, fig. 1; only the upper part of a pinna, found at S. Salem vein Pottsville; much like *N. moorii* from the bituminous region of west Pennsylvania, but with a thinner rachis, and oval leaflets. Coal Flora, 1880, 163, pl. 26, f. 4. In the interval of twenty years no other specimen had been found. See note to *N. moorii.*—*XIII? XV?*



Neuropteris angustifolia, or **cordata.** Brongniart, Hist. Foss. Veg. pl. 64; *Neu. acutifolia?* Brgt. etc.; *Neu. cordata,* Bunbury, Fl. C. Breton, pl. 21; *Neu. heterophylla,* Lesq. Geol. Pa. 1858, p. 859—Lesquereux, Coal Flora of Pa. Report P, page 89, plate 8, figs. 2, 3, 6, 8, 10, 11; also page 734, announcing the recent discovery (1880) of a variety with *hairy* leaves, like *N. hirsuta* from Kansas.—Collett's Ind. 1882, p. 52,

Neriopteris lanceolata. New. *See p. 449.*



Neuropteris augustifolia, *continued.*

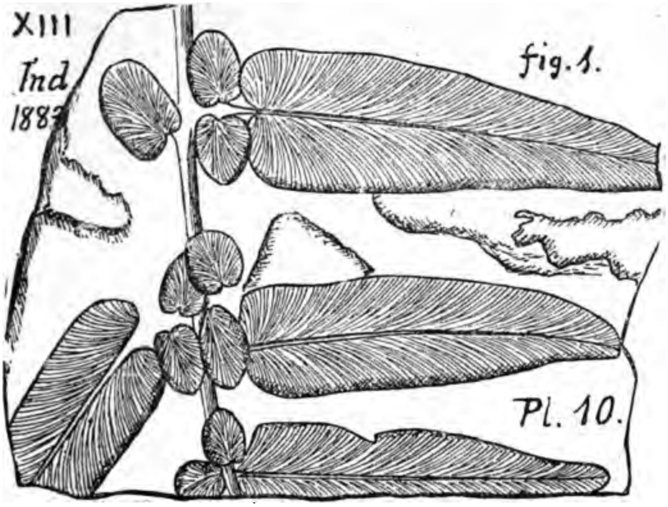
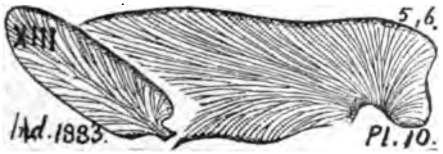


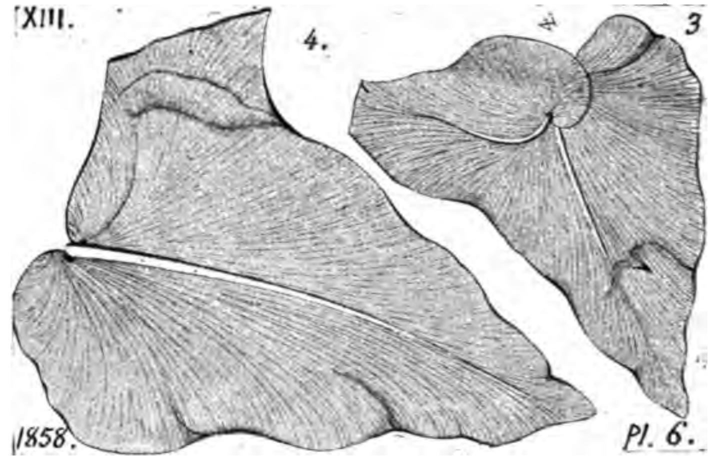
Plate 10, fig. 1.—*XIII.* Whole thickness of Middle Coal Measures, but more abundant near XII; Cannelton, etc., in W. Pa.; Mammoth bed, Anthracite region, Lesq. Numerous in the roof shale of the Pittsburgh coal bed, at the mouth of Redstone creek, Fayette Co., Pa., KK, p. 236. Fine specimens to be got from the roof shale of the Redstone coal, next above the Pittsburgh, KK, p. 254, *XV.* See a large leaf of it, spec. *C* 3–2 (OO, p. 239) White's coll. from roof shales of *Waynesburg coal*, *XV.* Spec. *C* 4–3, –5 (two), –8, –11 (eight specimens) from the same, but at another locality in Greene Co.

Neuropteris biformis. See **N. elrodi.** X.

Neuropteris callosa. (Lesquereux, Coal Flora, page 115, plate 16, figs. 1 to 8.) Collett's Ind. Rt. 1883, page 52, plate 10, figs. 5, 6. Found in *Upper Coal Measures*, at New Philadelphia, Wilkesbarre, etc., in Anthracite field; Pomeroy, O. *XV.*

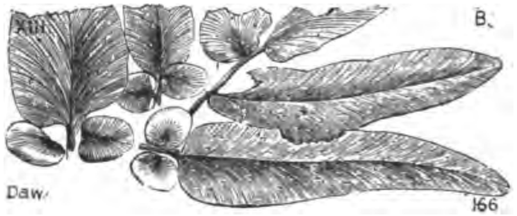

XIII
Ind. 1883.
5, 6.
Pl. 10.

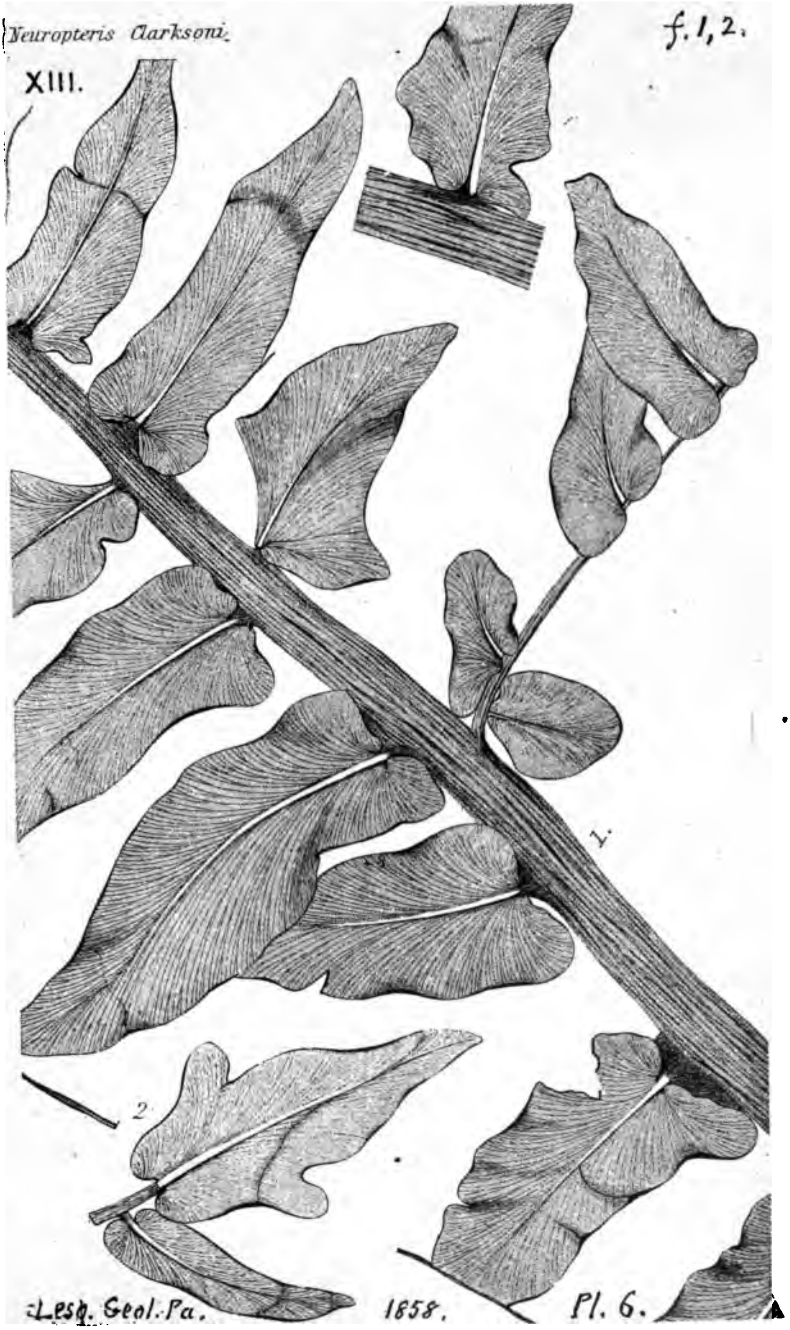
Neuropteris clarksoni. Lesq. Geol. Pa. 1858, p. 857, pl. 6, f. 1, 2, 3, 4, from the collections of Mr. Clarkson, at Clarkson, in the Northern Anthracite field, Pa. Related to *N.*

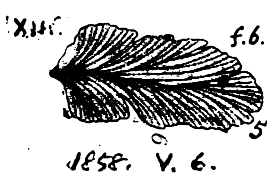


auriculata, Brgt., but has a thick middle nerve and peculiar outline to its upper leaflet, the same in all specimens. Also, Coal Flora, 1880, p. 94, pl. 9, figs. 1 to 6. Its form is variable, but its venation constant and strongly marked, always clear and distinct.—*XIII.* Locally very abundant, as at Oliphant, Wilkesbarre, Pittston, Carbondale. Mr. Lacoe has a large slab covered with fragments, and a part of a frond 1½ feet long, many of its pinnules bearing the supposed *fruit.* Species rare in western coal fields; many at Cannelton; none in Ohio; some in Mazon creek nodules, Ill.; one spec. from Missouri. —This plant crowds the roof shale of the *Fulton-Cook* coal (*B*) in the Ocean mine tunnel, Shoup's run, Broad Top, Huntingdon Co., Pa. (I. C. White, T3, p. 278, 319.)—*XIII.* Recognized by Lacoe among the species collected by Mr. Koch, July, 1889, in a Tipton run bed, Blair Co., Pa., which I assign to the *Pocono formation*, *X.*—(*See fig. on p. 453.*)

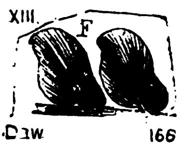
Neuropteris cordata (after Bunbury). Dawson's Acad. Geol. 1868, page 447, fig 166 B, Nova Scotia *Coal measures.* *XIII.*




Neuropteris Clarksoni.
XIII.
f. 1, 2.
1.
2.
Lesq. Geol. Pa.
1858.
Pl. 6.

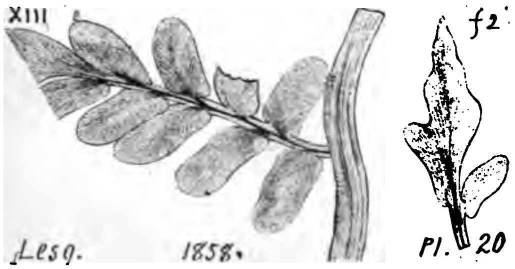


Neuropteris crenulata? Brgt. Lesq. Geol. Pa. 1858, p. 859, pl. 5, fig. 6; one single leaf of this European fern, found by Lesquereux at the Anthracite Salem vein, Pottsville; but its nervation and very small round teeth around the leaf identified it. Also, Coal Flora, 1880, p. 116, pl. 16, figs. 9 to 11. Specimens from Wilkesbarre, and from the Tremont tunnel vein, throw doubt on the identity. (Lesq.) A few specimens at Cannelton, W. Pa.—*XIII.*

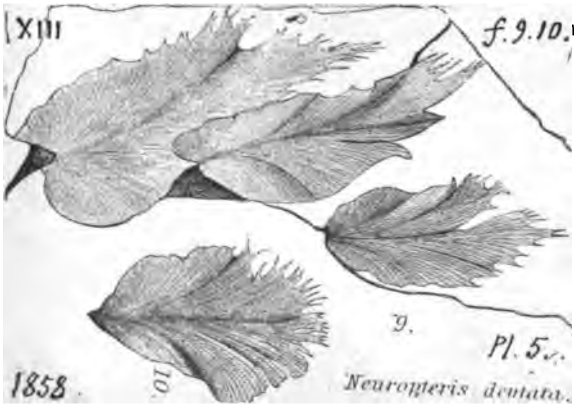


Neuropteris cyclopteroides. Dawson's Acadian Geology 1868, page 447, fig. 166 F, Nova Scotia *Coal measures. XIII.*

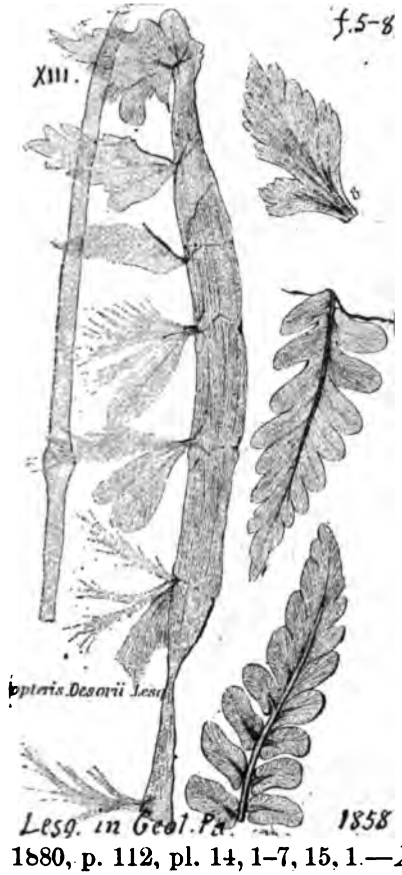
Neuropteris dawsoni. See **Megalopteris dawsoni.** Hartt. *VIII–IX.*

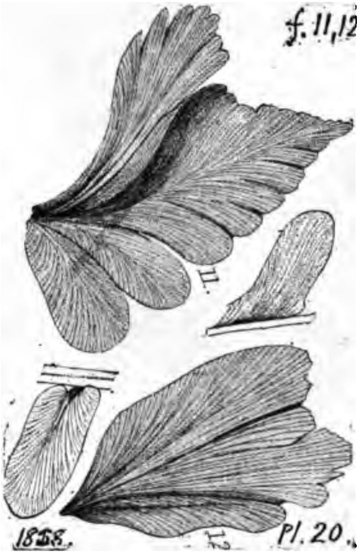


Neuropteris delicatula. Lesq. Geol. Pa. 1858, p. 858, pl. 20, f. 2, from Salem vein, Anthracite, Port Carbon; one small branch; afterwards, not mentioned in Coal Flora, 1880.

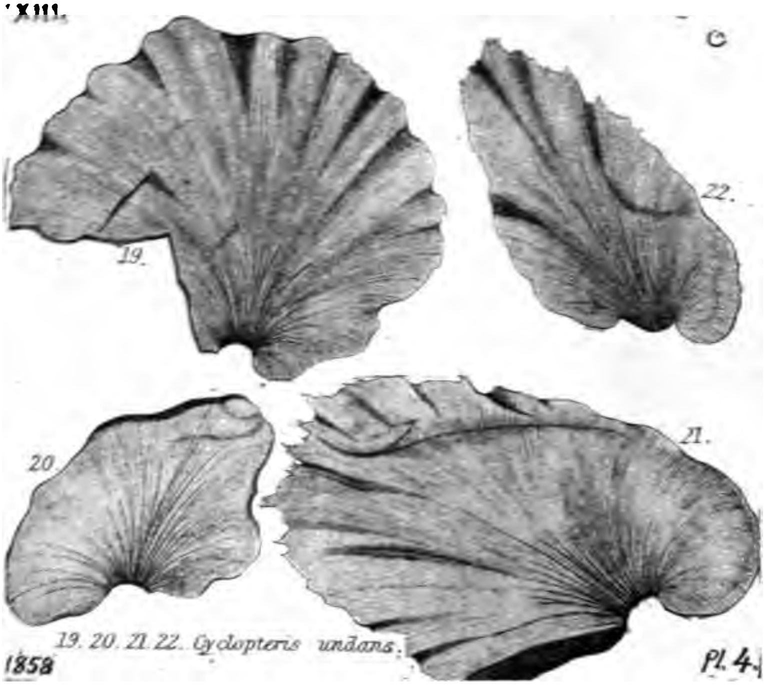


Neuropteris dentata. (*Cyclopteris undans*, Lesq. Geol. Pa. 1858, page 885, pl. 4, figs. 21, 22), Lesq. Geol. Pa. page 859, pl. 5, figs. 9, 10; very scarce; Salem vein, Port Carbon, anthracite; fine species, with the slenderest and narrowest nerves of all; only a bit of a pinna (f. 9) and probably an end leaflet (f. 10). Coal Flora, 1880, p. 82, pl. 5, figs. 7, 8. Outline like *N. fimbriata*, but venation allied to *Cyclopteris ciliata*, Heer, just as *N. fimbriata* is allied to *C. lacerata*, Heer. Blakely and Gate veins, near Pottsville.—*XIII.*





Neuropteris desorii. Lesq. Geol. Pa. 1858, p. 859, plate 5, figs. 11, 12; plate 20, figs. 5, 6, 7, 8; the most variable of the *Neuropterids;* but nervation always the same, and the varieties all on the same slates, showing transitional forms; very like *N. heterophylla*, Brgt., but has thinner and less distinct veins. — Coal Flora, 1880, p. 112, pl. 14, 1–7, 15, 1.—*XIII.* Salem vein, Pottsville; Blakley vein, near Archibald; Wilkesbarre; Cannelton, W. Pa.; not West.—Lesq. Geol. Pa. 1858, p. 855. pl. 4, f. 19 to 22; pl. 5, f. 1, 2, from Gate vein, anthracite, at Middleport, Sch. Co., Pa., same as *Neuropteris undans.* All the leaves lie together on the same slate.—Coal Flora, P, 1880, p. 82, plate 5, f. 7, 8; species extremely rare in our coal measures; leaves



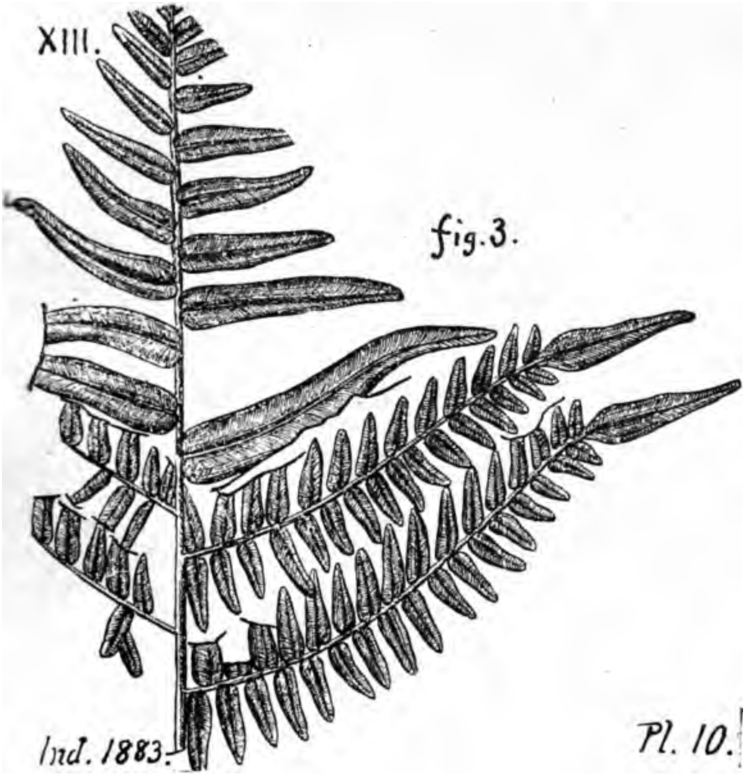
shaped like *Neur. fimbriata* but veined differently, and the texture is thick, hard, rigid. Found in Blakely and Gate veins, at Pottsville, Pa.—*XIII.*

Neuropteris dluhoschi. Europe. See **N. elrodi.** *X.*

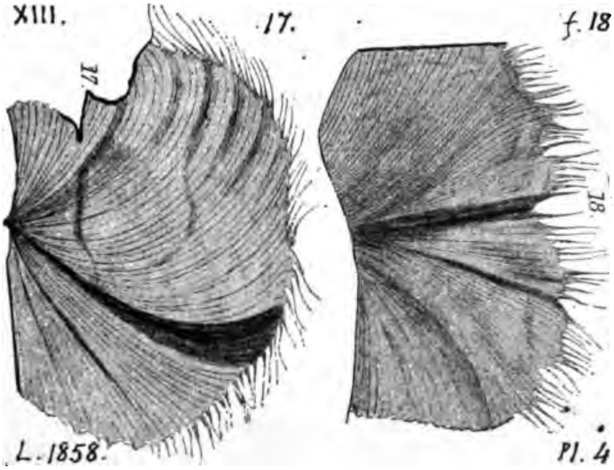
Neuropteris elrodi. (Lesquereux, Coal Flora, page 107, 1880, plate 13, fig. 4; also page 735, 1884, plate 96, figs. 1, 2, usually accompanying and related to *Neu. smithii ;* identical with European *Neu. dluhoschi* of Stur; possibly also with *Neu. biformis* of Lesq.—*X? Lower Coal Measures*, in Alabama, Georgia and Tennessee; and in Whetstone grit of Orange Co., Ind., (Lesq,) Collett's Ind. 1882, p. 52, pl. 10, f. 3. Not rare in sub-carb. limestone. (Collett.) *X.—See p. 457.*

Neuropteris (*Cyclopteris*) **fimbriata.** Lesq. Geol. Pa. Vol. 2, page 855, plate 4, figs. 17, 18. From upper anthracite (Salem vein) at Pottsville, Pa. Also many fragments in upper anthracite beds of that basin ; also a beautiful specimen in Mr. Lawton's cabinet at Bartow, Ohio; a less perfect one in Rev. Mr. Brown's, at Charlestown, W. Va.

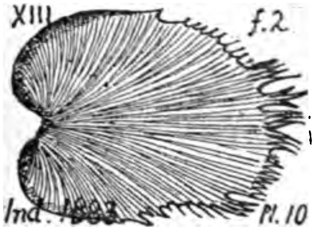
Neuropteris elrodi. *See p. 445.*



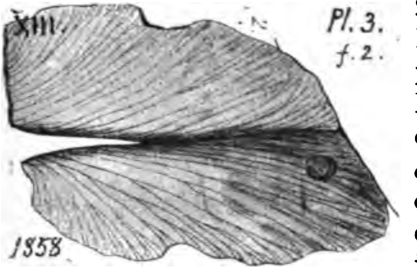
Neuropteris fimbriata, *continued from p. 455.*

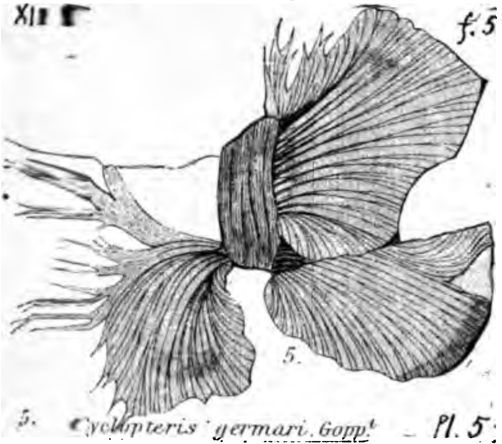


The nerves branch and become parallel, and correspond with the threads of the fringe. Unlike all known species of *Cyclopteris*, it has some affinity with *Neuropteris crenulate*, Brgt. The discovery of this fern led Lesquereux to write: "Though we have many species of *living ferns* with fimbriate margins, it is the first time that a species of this form has been found in a petrified state and from the old formations. But every day the study of fossil remains shows us something new, and teaches us that the primitive organic structures of this world were much more perfect than is generally believed. Truly, each form of being was perfect from the first." Later, this species was found in Mazon creek nodules, Illinois, (II, 430; IV, 384, pl. 6, f. 4); abundantly in nodules in Hildreth's Ohio collections at Marietta; in the Kittanning coal bed at Cannelton, Beaver Co., Pa.; and in many other collections; but not in the sub conglomerate measures.—Coal Flora, page 81, plate 5, figs. 1 to 6. *Cyclopteris fimbriata*, Lesq. Jour. Boston S. N. H. Vol. 6; Geol. Pa. 1858, plate 4, figs. 17, 18. Not found in Subconglomerate coals; but abundant from the Conglomerate up to the Salem anthracite bed at Pottsville; Cannelton, Pa.; Charleston, W. Va.; Mazon creek nodules, Ill.; Marietta nodules, O., etc. Lesq.) Collett's Ind. 1882, p. 52, plate 10, fig. 2, Allegheny series, Coal Measures. *XIII.*

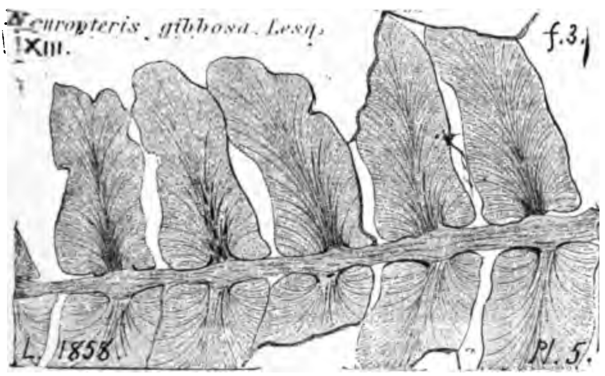


Neuropteris fissa. Lesq. Geol. Pa. 1858, p. 857, pl. 3, fig. 2; only a broken leaflet from Pottsville Gate vein, split by pressure? Like *N. ingens*, Lind.; but nerves thin and close. Allied to *Cyclopteris orbicularis.*—*XIII.* Anthracite coal measures.—Abundant in the Powelton shales, just over the *Fulton-Cook coal* (*bed B*) on Shoup's run, Broad Top, Huntingdon Co., Pa. Also, a few specimens seen in the *Barnet* (*bed A*) roof shale at the Reed mine, (T3, 62, 278, 313.)—*XIII.*

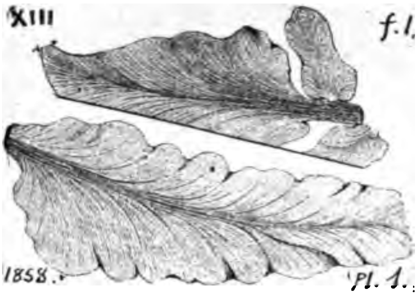




Neuropteris (*Cyclopteris*) **germari.** (Goeppart, Syst. Fol. Foss.) Lesq. Geol. Pa. Vol. 2, page 856, plate 5, fig. 5. Only a small specimen of this remarkable species was found at the Salem anthracite mine, near Pottsville, Pa. The form of the leaves is as peculiar as is their mode of attachment to the stem (rachis), which is thick and striated narrowly. Its leaves somewhat suggest *Neuropteris desorii.* In Coal Flora, 1880, P, p. 113, Lesquereux identifies it with the European *Filicites crispus*, and with *Adiantites germari ;* changes its name to *Neuropteris germari ;* and figures (plate 18, figs. 3, 4, 5) specimens from the anthracite Salem vein ; from Mazon creek nodules, Ill. ; and from a subconglomerate sandstone (*Chester group*) in Mercer Co., Ill.—*XIII* and *XI.*

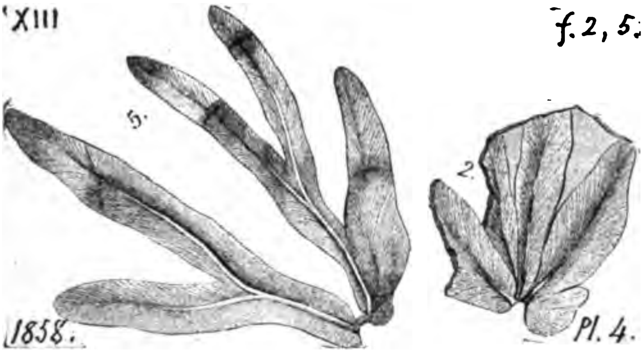


Neuropteris gibbosa. (*N. undans*, Lesq.) Lesq. Geol. Pa. 1858, p. 858, plate 5, fig. 3 ; a fine species somewhat related to *N. flexuosa*, but with thinner, closer nerves, etc., without middle nerve; opposite leaflets, etc., fruit holes (?) at base of some leaflets.—Anthracite Salem vein, Pottsville. NOTE—Lesq. has identified his *N. undans* with it for reasons given in his Coal Flora, Rt. P, 1850, p. 84, where he says it was found in "Upper Anthra-



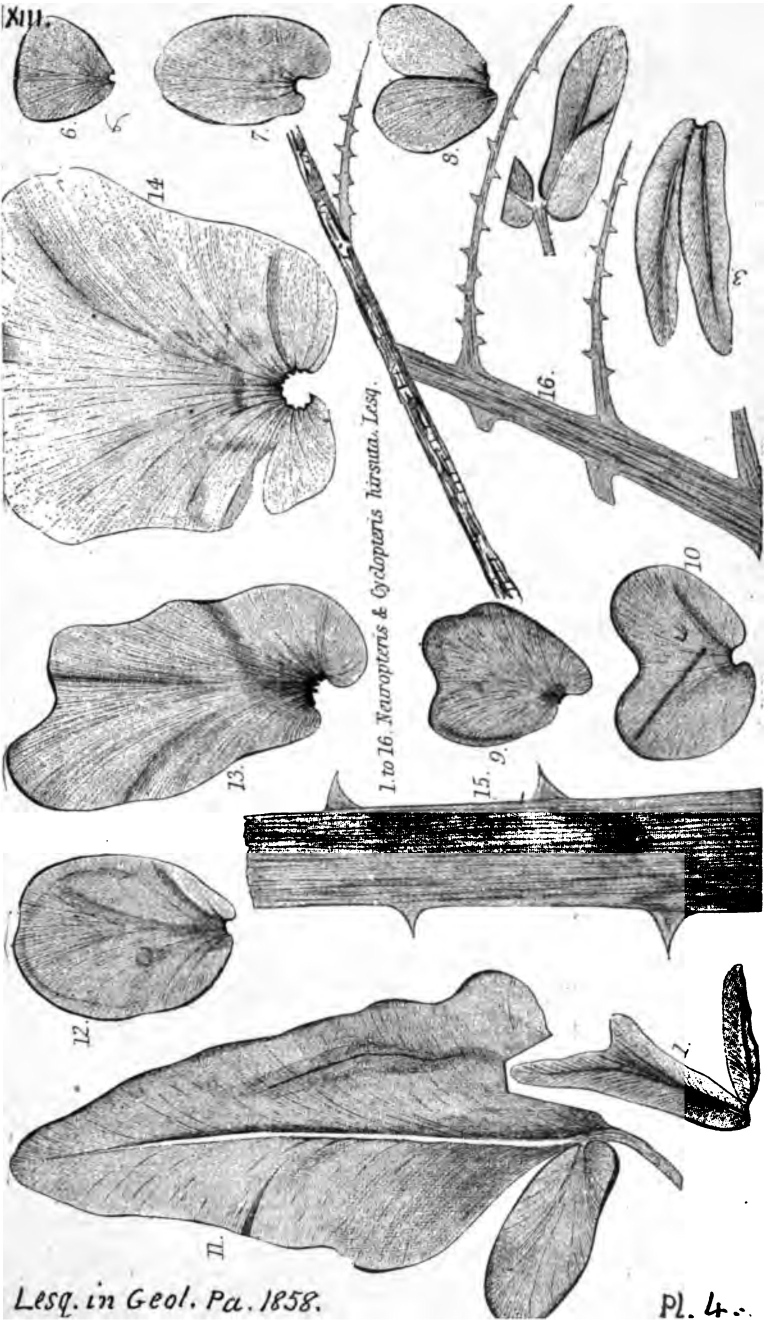
cite Measures, Gate and Salem veins," and that he had received one *Cyclopteroid* specimen of it from Cannelton. In this, and other instances, it must be understood that the Gate and Salem veins are not in the same horizon and not *upper* anthracite beds, any more than the Kittanning group at Cannelton, W. Pa. I have marked all these instances as *XIII*, Allegheny river series.- Coal Flora, plate 5, figs. 1, 2, as ***undans***, were found in Gate vein, at Middleport, Schuylkill Co., Penna.—(*See figure of N. undans on p. 456.*)

Neuropteris heterophylla. See **N. angustifolia.** XIII.



Neuropteris hirsuta. (Compare *Neuropteris angustifolia.*) Lesq.Geol. Pa. 1858, p. 857, pl. 3, f. 6; pl. 4, figs. 1 to 16. (***Neuropteris cordata***, Brgt., and Lind. and Hutt.; *N. angustifolia*, Brgt.; *N. scheuchzeri*, Hoffm.; *N. acutifolia*, Brgt.) First notice of the short hairs covering the leaf was by Bunbury, in Nova Scotia field. Hardly a good specimen fails to show them under a lens; but brittle, they easily fell off, leaving sometimes only a few on part of a leaf; sometimes the whole leaf is covered with them. The commonest plant of all in the Pennsylvania coal fields, lower and upper coal beds alike. The short petioles remain exactly like sharp thorns on the little branch (rachis) when the leaflets have fallen off from it; the point of attachment was so fine and tender, that Lesquereux had only seen the leaflet remaining on its petiole once or twice among many thousand specimens.

Neuropteris and Cyclopteris hirsuta, *continued.*

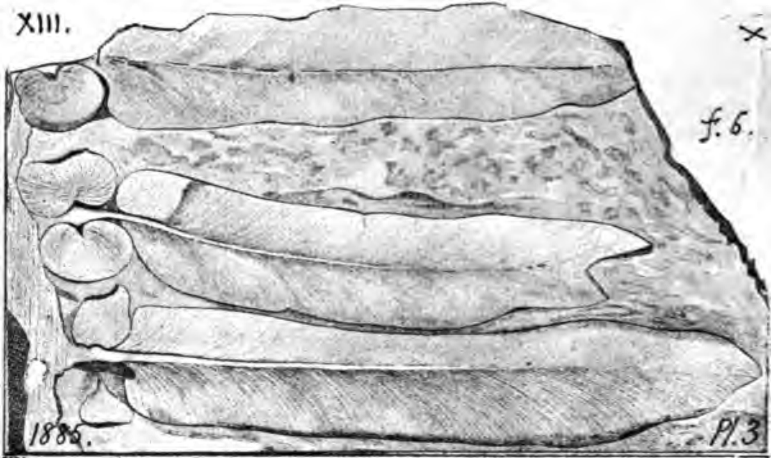


1 to 16. *Neuropteris & Cyclopteris hirsuta. Lesq.*

Lesq. in Geol. Pa. 1858.

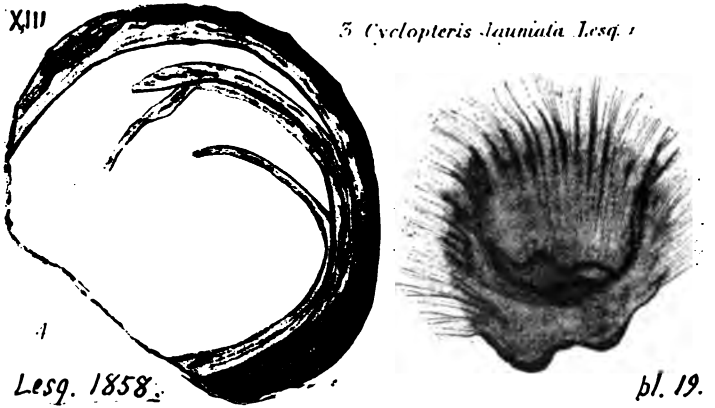
Pl. 4.

Neuropteris hirsuta, *continued.*



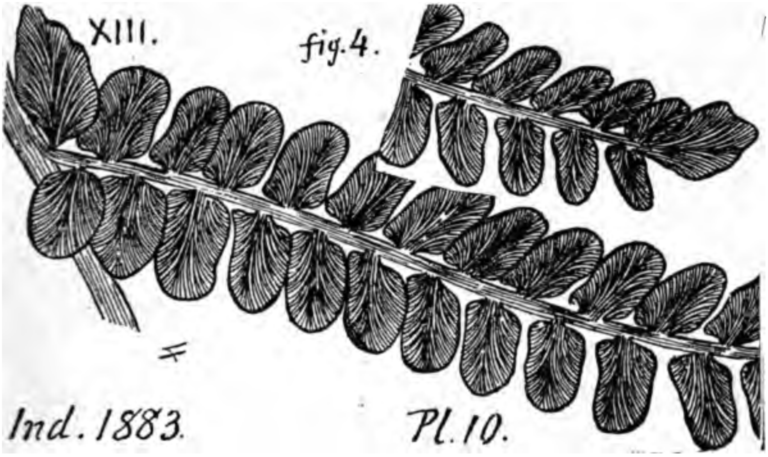
The smaller end-pinnules differ from the larger lower ones; thus, by following the transformations, the species of other authors are set aside. See, also, Coal Flora, 1880, p. 88, pl. 8, figs. 1, 4, 5, 7, 9, 12. Abundant in roof shale of bed B, (*Fulton-Cook*) at Powelton, Broad Top, Huntingdon Co., Pa. (T3, p. 62, 278;) at old Barnet mine, (p. 315;) and at Ocean mine tunnel, (p. 319.)—*XIII.*

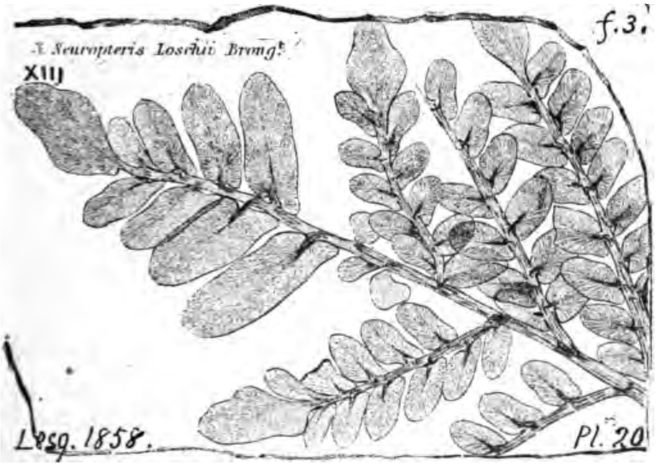
Neuropteris (*Cyclopteris*) **laciniata.** Lesq. Geol. Pa


XIII
3 Cyclopteris laciniata Lesq.
4
Lesq. 1858.
pl. 19.

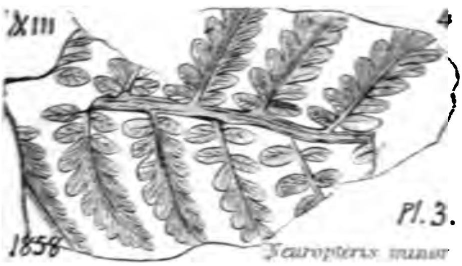
1858, II, p. 855, plate 19, f. 3, 3 a. Surface covered with scales which fall off and show the nerves. One anthracite specimen found with *Odont. squamosa*, has a similar scaly surface and similar nerves, confirmed Lesquereux's view, that named species of *Cyclopteris* and *Neuropteris* were identical.—*XIII.*

Neuropteris loschii. Brogniart, Hist. Veg. Foss. plates 72, 73; Gutbier; Rœhl; Schimper; Heer; Le^o^quereux, Geol. Pa. 1858; Illinois Rt. Vol. 2; the *Gleichenites Neuropteroides* of Göppert.—*XIII*, from base to top of Middle Coal Measures, red Marietta beds above Pomeroy coal, O.; abounds at horizon of Pittsburgh bed in Ohio; not rare in Mazon creek nodules, Ill.; Cannelton, W. Pa.; Clinton, Mo. (Lesq.) Collett's Ind. Report 1883, plate 10, fig. 4. Recognized by Lacoe among the specimens collected by Mr. Koch, July, 1889, at the Tipton Run mine, Blair Co., Pa., from beds in the *Pocono formation*. *X*. NOTE. See **Cyclopteris elegans.** Lesquereux's fig. 3, pl. 20 of Geol. Pa. is added to show how the leaflets vary along the same leaf.

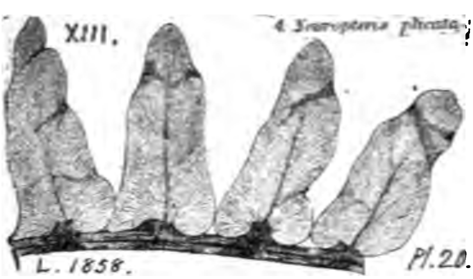

XIII.
fig. 4.
Ind. 1883.
Pl. 10.



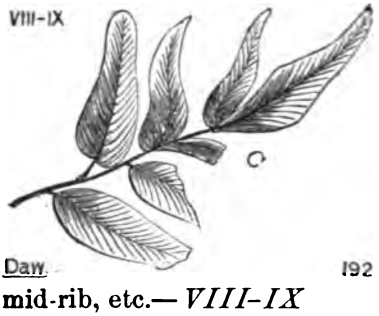
Neuropteris minor (*desorii ?*). Lesq. Geol. Pa. 1858, page 859, plate 3, fig. 4, with a terminal leaflet very small and oval. Specimen found by Desor, in an anthracite bed at Tamaqua, Schuylkill Co., Pa. Note. Perhaps a decayed leaf of *N. desorii.*



Neuropteris plicata. Sternb. (Lesq. Geol. Pa. 1858, page 857, plate 20, fig. 4, the only specimen of this European plant found, in the Salem vein, at Pottsville. Difficult to separate the figured species *plicata* and *flexuosa*. See discussion of it in Coal Flora, 1880, pages 96, 97, where *plicata* is shown by plate 10, figs. 1 to 4. Lesquereux cannot recognize the European *flexuosa* in any American specimen. His figured *plicata* abound in (*XV*) Monongahela coal measures, at Pomeroy, O., and also in the Pittsburgh coal bed, but I. C. White has many specimens from a coal bed in (*XVII*) Upper Barrens, 400′ above the Waynesburg coal. In the Darlington coal, Q, 54.—*XIII.*

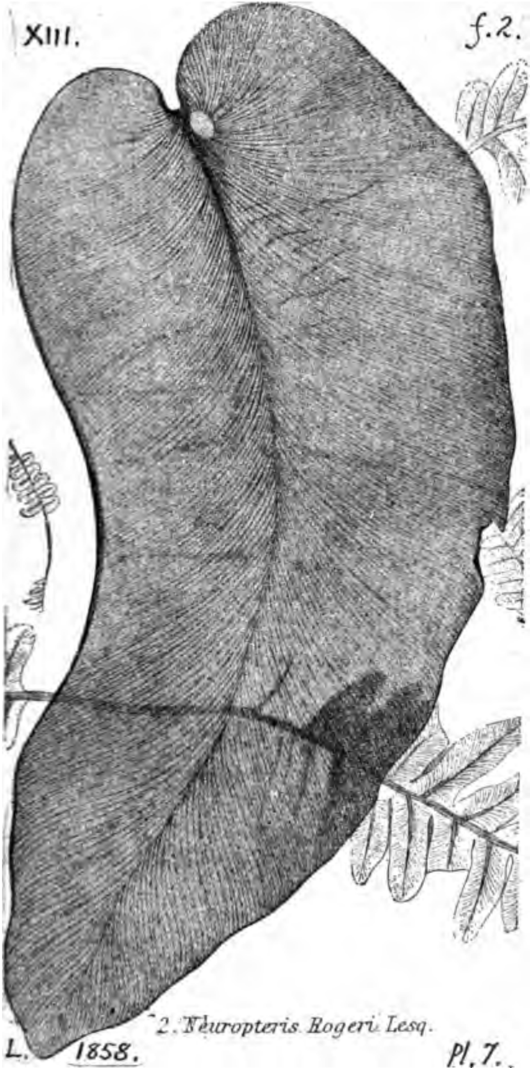


Neuropteris polymorpha. Dawson, Acad. Geol. 1868, p. 548, fig. 192, C, terminal pinnule; very abundant in the *Upper Devonian shales*, near Carlton, St. John, N. B. Apparently several species, but found in one and the same frond. Like *N. heterophylla*, Bgt. or *N. hirsuta*, Lesq., but has a smooth surface, delicate mid-rib, etc.— *VIII-IX*



Neuropteris rarinervis. Occurs in the Beaver Co. coal shale, under the Darlington coal. Q, p. 220. *XIII.*

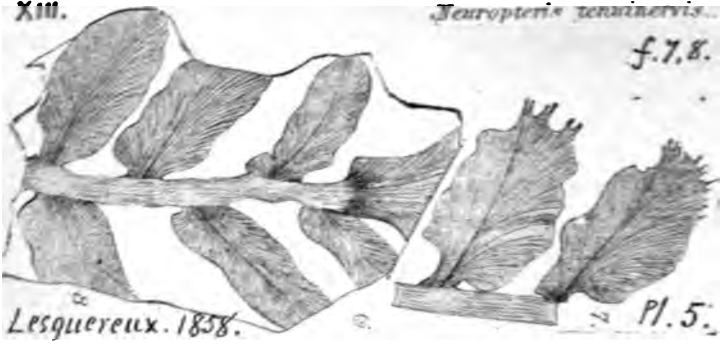
Neuropteris rogersi. Lesq. (Improperly printed Rogeri in Geol. Pa. 1858, p. 856, plate 7, fig. 2; but correctly in Coal Flora.) This is the largest and most beautiful *leaf* of all thė *Neuropterids;* leaves only found, many of them, but all at one spot and without stems; Gate vein, anthracite, near Port Carbon, Schuylkill Co., Pa. Same as *N. speciosa*, Lesq. Bost. S. N. H. Journ. VI, p. 417; Coal Flora, 1880, p. 83, pl. 6, figs 7 to 10; one of the most beautiful and rarest of American *Neuropterids.* S. Salem vein, roof shale. In 1879 two specimens were found by Mr. Mansfield in his mine roof at Cannelton, Beaver Co., Pa.—*XIII.*


XIII.
f. 2.
L. 1858.
Pl. 7.

2. Neuropteris Rogeri Lesq.

.*Neuropteris tenuifolia.* See **Cyclopteris elegans.** *XIII.* Recognized by Mr. Lacoe in Koch's collections at the Tipton mines, Blair Co., Pa., July, 1889, from beds assigned by me to the *Pocono formation.* *X.*

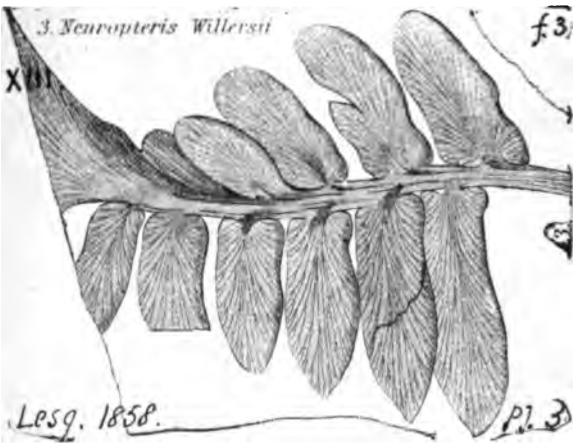
Neuropteris tenuinervis. Lesq. Geol. Pa. 1858, p. 859, pl. 5, figs. 7, 8, from Gate vein, anthracite, Pottsville, distinguished (1) an abnormal form of leaflet, (2) a very slender, deep, straight middle nerve, looking like a cleft splitting each pinnule lengthwise; were it not for this, figs. 7, 8, would be thought different species. Looks something like *Odontopteris subcuneata*, Bunb.—Coal Flora, p. 125, pl. 22, figs. 2, 3, the only two specimens seen by Lesquereux up to 1880.—*XIII.*


XIII.
Neuropteris tenuinervis.
f. 7, 8.
Lesquereux. 1858.
Pl. 5.

Neuropteris undans. See **N. gibbosa.** *XIII.*

Neuropteris vermicularis, in the Darlington coal bed, Beaver Co., Pa., Q, p. 54. *XIII.*—Note. Recognized by Mr. Lacoe in Koch's collections at the Tipton Run mines, Blair Co., Pa., from beds assigned to the *Pocono formation*. *X.*

Neuropteris willersii. (callosa?) Brgt. Lesq. Geol. Pa. 1858, p. 858, pl. 3, fig. 3, from Gate vein, anthracite, Pottsville, Schuylkill Co., Pa. Nervation peculiar, making the species reference doubtful. In Coal Flora, page 86, Lesq. agrees with Schimper that it is probably *N. callosa*. Cannelton, Beaver Co., Pa.—*XIII.*



Neuropteris ——— ? in the *Forkston coal* bed floor, in Wyoming Co., Pa., supposed by White to be at the base of the Conglomerate, like the Campbell's Ledge shale, at Pittston, Luzerne Co. G7, p. 43.—*XII*, *XII.*

Neuropteris *leaves*, occasionally seen in the 30′ dark shale under the Bolivar clay, West. Co. KKK, p. 161.—*XIII.*

Neuropteris fragments are seen in the *Decker's creek shale*, at Morgantown, W. Va. L, p. 37.—*XIII.*

Neuropteris ———, numerous in the Pittsburgh coal bed roof, at Jeffries' mine, Washington Co., Pa. K, p. 205.—*XV.*

Neuropteris, over the *Waynesburg coal*, K, 59. *XV.*

Neuropteris, mostly good impressions, in laminated sandy shales, under the *Washington coal bed*, K, 106. *XVI.*

Neuropteris. One single fragment, and the only *fern* seen in the roof shales of the *Washington upper coal*, at the exposure one mile south of the borough. KKK, p. 305. *XVI.*

Neuropteris. One imperfect leaflet seen in the *White limestone* (No. VI of Stevenson's series; *Washington upper limestone.*) K, p. 47, 242, in the tunnel section near the borough.—*XVI.*

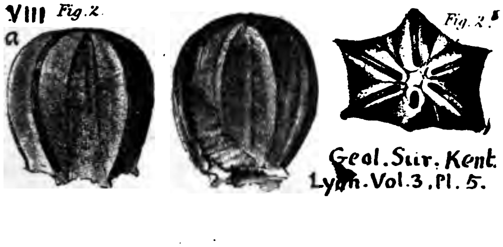
Neuropteris leaves may be found in the shale overlying limestone No. X of Stevenson's series, on Hart's run, Greene Co. K, p. 165.—*XVII.*

Noeggerathia bockschiana, on page 7, as a synonym for *Adiantites bockschiana*, ought to be written **Archæopteris bockschiana.** (Lesquereux, MS. letter of December 27, 1888.)—See **Archæopteris bockschiana.** *X.*

Noeggerathia minor. See **Arch. minor.** *X.*

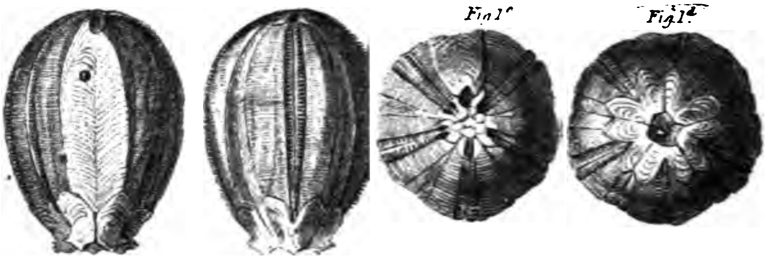
Noeggerathia obtusa. See **Arch. obtusa.** *IX.*

Nucleocrinus angularis. (*Olivanites angularis,*) Lyon. Geol. Sur. Kentucky, Vol. 3, page 492, pl. 5, fig. 2, *natural size*, front side of a large specimen; 2 *a*, anal side; 2 *b*, summit. A few specimens found



lying between the *Marcellus black slate* and hydraulic cement beds, at Rock Island; at foot of Ohio falls; near Louisville; and in Indiana. Confined to bottom beds. *VIII a.*

Nucleocrinus verneuili. (*Olivanites verneuili*, Troost.

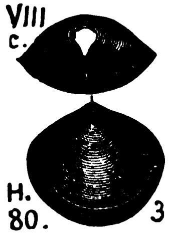


Geol. Tenn. Report 6, 1841, page 487, plate 5, fig. 1, *nat. size*, anal side; 1 *a*, opposite side; 1 *c*, summit; 1 *d*, base; abundant a few feet beneath the *cement layers*, at Ohio Falls, and on Beargrass creek. Fig. 1, giving the dissection of the plates, is omitted.—*Corniferous. VIII a.*

Nucleospira pisiformis. Hall. From Collett's Indiana

Report of 1881, p. 301, plate 25, figs. 22 to 25. Dorsal, ventral, lateral and cardinal views of a ventricose specimen, having much the appearance of *N. ventricosa* of the Lower Helderberg group. Figs. 26, 27, dorsal and lateral views of a less ventricose specimen, with surface almost entirely covered by fine setæ; fig. 28, dorsal view of a specimen with more prominent beak.—*Niagara, V b.*

Nucleospira concinna. (*Atrypa concinna.*) Hall, 1884, p. 200, fig. 80, 3. *Hamilton.*—Claypole, F2, preface, p. xiii, Perry Co., Pa. *Hamilton.*—Specimens 808–1 (determined by James Hall) from Dingman's Falls, Pike Co. *VIII c.*—809–7 (determined by James Hall, Nov., 1888); 809–8 (cast, doubtful); 809–10; (OO p 235) from collections along canal near Port Jervis, Orange Co. N. Y. in *Hamilton rocks. VIII c.*

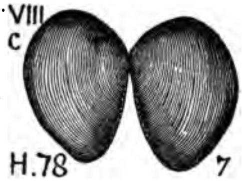


Nucleospira ——— ? Specimens 506-2 *c* (two casts), and 506-13 *b*, in Sherwood's Tioga Co. collections, from the Mixtown *Upper Chemung* strata, *VIII-IX.*

Nucula anodontoides. Meek, Reg. Rt. Univ. W. Va. 1871, *coal measures.* KKK, 310. In *Crinoidal limestone* 250′ below *Pittsburgh coal.* L, 35.—*XIV.*

Nucula bella. Specimens 808-12, -13, so named by J. Hall, November, 1888, in collections at Dingman's Falls, Pike Co. *Hamilton*, *VIII c.*

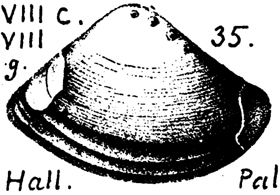
Nucula bellatula. See **Nucula bellistriata**; also **Palæoneilo constricta.** *VIII c.*

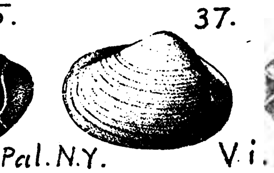


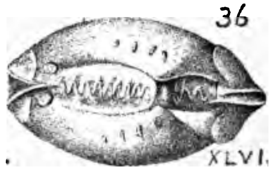
Nucula bellistriata. (*N. bellatula.*) Hall, 1844, p. 196, fig. 78, 7, *Hamilton.* (Conrad, Ann. Rt. N. Y. 1841.)—Claypole in Perry county, Pa. F, 2. Specimens from Barnett's mill, 2-13; 5-18; 5-42; 5-47; 5-87; 93-4, 9, 11, 13, 14, 15, 27; 97-16, 19, *Hamilton, VIII c.*—In Montour region, 100′ below top of *Hamilton*, G7, p. 229. Identified by I. C. White in Beaver and Lawrence counties, Pa., in *Ferriferous limestone* of the *Allegheny series*, Q, 47; Q2, 62, 200.—*XIII.*

Nucula hubbardi, Winchell. See **Palæoneilo sulcatina,** Hall. *VI.*

Nucula corbuliformis, Hall, Prel. Not. Lam. 1870, *Hamilton* and *Chemung.* Pal. N. Y. Vol. V i, pl. 46, figs. 25, left valve; and 26, hinge view of compressed specimen; fig. 37, *enlarged*, partial cast of right valve. *Lower Chemung.*—Spec. 808-12, 808-13, (OO, p. 235) in Fellows' coll. at Dingman's Falls, Pike Co., Pa., in *Hamilton strata*, *VIII c.* In Huntingdon Co. long railroad cut near the Bedford Co. line, in *Hamilton middle shales*, near the bottom, Cove Station, *VIII c.* In Columbia Co., Pa., in bed No. 30 of I. C. White's





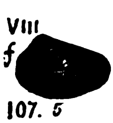


Rupert section, *Chemung* (G7, p. 69); at Stony Brook (p. 72); beds 21, 22, 25 of Fiedler's creek section, *Upper Chemung* (p. 96); and in Lower Mahoning township, Northumberland Co. (p. 367).—*VIII c* and *g*.

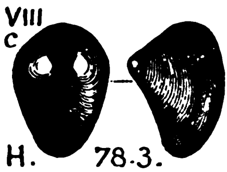
Nucula levata. See **Tellinomya levata,** *II c*, *III b*.

Nucula lineata. See **Tellinomya lineata.** *VIII c*.

Nucula lineolata. Hall, 1884, p. 245, fig. 107. 5. *Portage formation, VIII f.* Found by White in beds 38 and 41 of the Rupert section, Columbia Co., Pa., G7, p. 69. See Claypole's specimens, 68–3, 4, 5, 6, 7.



Nucula lirata. (*Cucullæa opima.*) Hall, 1844, p. 196, fig. 78, 3, Hamilton formation, *VIII c*. (Conrad, Journal Acad. N. Sci. Phila. Vol. 8, 1842.) Claypole's specimens 77–18, 21, 88, got in Newport Narrows, Perry Co., from *Hamilton strata*, *VIII c*.



Nucula machœrœformis. See **Tellinomya machær.** *V a*

Nucula mactrœformis. See **Tellinomya mactræ.** *V a*.

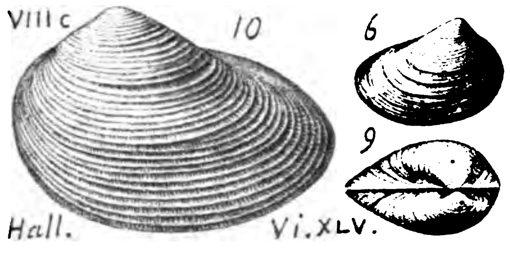
Nucula (*Nuculana*) *nasuta.* See **Leda nasuta.** *XI*.

Nucula oblonga. See **Cleidophorus oblongus.** *VIII c*.

Nucula parva. McChesney, Des. New. Pal. Foss. 1860.—M. & W., Geol. Sur. Ill., Vol. 5, 1873, p. 589, plate 26, figs. 8 *a*, *b*.—Recognized by Stevenson (KKK, 310; L, 35) in the *Crinoidal limestone* 250′ beneath the Pittsburgh coal.—*XIV*.

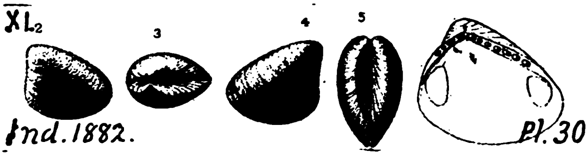
Nucula.(*Nuculana*) *poststriata.* See **Lyrodesma post.** *II c*.

Nucula randalli. Hall, Prel. Not. Lamell, 1870, *Hamilton* and *Chemung*. Pal. N. Y. Vol. V, part I, plate 45, fig. 6, *natural size*, right valve; fig. 9, hinge; fig. 10, *enlarged*, left valve. Collected by Claypole at New-

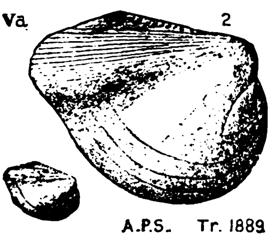


port Narrows, Perry Co., Pa. Specimen 77 *d*, 13, in *Hamilton upper shales. VIII c.*

Nucula shumardana. Hall, Trans. Alb. Inst. 1856. Also Collett's Indiana Rt. 1882, p. 343, plate 30, figs. 2, 3, *enlarged twice*, usual form; figs. 4, 5, longer than usual; f. 6, *enlarged three times*, outline showing hinge. *Sub carboniferous* limestone, at Spergen Hill, etc., Ind.—*XI.*

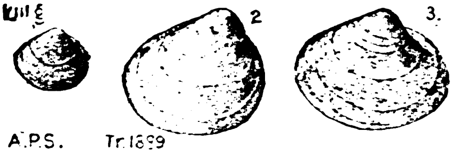


Nucula sinuosa. Simpson, new species, 1888. Shell small, ovate cuneate in outline, subnasute behind; height varying from one-half to two-thirds the length, usually slightly more than one-half; anterior and middle portions of the basal margins rounded, somewhat abruptly constricted towards the posterior end; posterior margin obliquely truncate; anterior end abruptly rounded; cardinal line, anterior to the beak, sharply declining; more gradually sloping to the posterior. Valves slightly convex, greatest thickness of the shell a short distance below the umbo. Beaks from one-third to three-fifths of the length of the shell from the anterior end, extending above the hinge line, compressed, sharp, not prominent. Umbonal ridge distinctly defined, subangular, with a shallow depression below it, which is most conspicuous at the postbasal margin, becoming obsolete on the upper half of the shell; posterior slope marked by fine, sharp, slightly divergent striæ. There are also fine concentric striations, which on the specimens observed are obscure, the surface appearing smooth. Hinge line marked by frequent crenulations. Three specimens measured have each a length of 10 mm.; height varying from 5 to 7 mm. In the striation of the posterior slope this species resembles *Nucula poststriata*, of the Trenton and Hudson river groups, but may be distinguished from that species by its less gibbous form, the constriction of the postbasal margin, and the conspicuous depression below the umbonal ridge. *Formation and locality.*



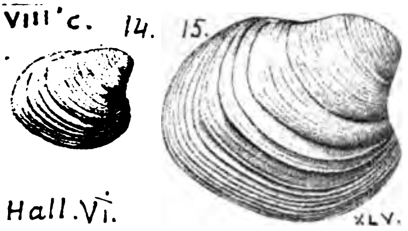
Clinton group, McKee's ore bank, seven miles northwest of Lewistown, Mifflin county, Pennsylvania. (Proc. Am. Phil. Soc. Dec., 1888. Transactions, 1889, Art. VIII, page 451, fig. 19.) Founded on specs. 501–48,–51; 502–16; 505–11,–41,–42; from *Clinton shales*, over *fossil ore bed*. *Va.*

Nucula tumida. England. See **N. ventricosa.** *XIII.*

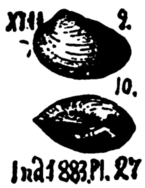


Nucula subtrigona, *new species*, Simpson. Proc. Amer. Phil. Soc. Philada., Dec. 1888, published in Transactions, Art. VIII, p. 451, fig. 1, *natural size*, fig. 2, the same shell *enlarged twice*, fig. 3, another, also *enlarged twice;* founded on specimens 502–10, –11, –21, in Ashburner and C. E. Hall's collections, at Orbisonia, Huntingdon Co.; C. E. Hall's coll. at Matilda furnace, Mifflin Co.; and 508–15, Hall & Fellows' coll. at Orbisonia, all from *Clinton*, *Va.* Shell somewhat variable in form, usually subtrigonal; length and height about equal; basal margin regularly rounded, not constricted toward the posterior end; posterior margin rounded or obscurely truncate; anterior margin abruptly rounded; cardinal line very abruptly declining anterior to the beak, more gradually declining to the posterior. Valves slightly convex, somewhat flattened as they approach the basal margin. Beaks about one-third the length of the shell from the anterior end, not prominent, compressed, extending above the hinge line; umbonal ridge obscure, very slightly arching upward; posterior slope very narrow, rounded. Surface marked by fine concentric striæ and occasional varices of growth. The concentric striæ are often very obscure, the shell appearing essentially smooth. Hinge line, posterior to the beak, marked by a row of fine, transverse teeth. Three specimens, representing the extremes in form, measure respectively 10, 4 and 4 mm. in length, and 10, 3 and 2 mm. in height. Larger specimens occur. This species may easily be distinguished from *N. sinuosa* by the absence of a constriction in the basal margin, furrow below the umbonal ridge and striæ on the posterior slope. *Formation and locality.* Chemung group, north of Blacklog creek, Orbisonia, Huntingdon Co., Pennsylvania.

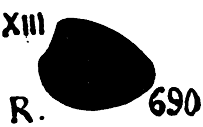
Nucula varicosa, Hall, Prelim. Notice Lamellibranches, 1870, *Hamilton*. Pal. N. Y. Vol. V i, plate 46, fig. 14, *natural size*, right valve; fig. 15, *enlarged*. Claypole's specimens 80–17, of White's collections, from Bloomsburg, Columb. Co. Pa. from *Catskill* strata. *IX*.


VIII'c. 14.
15.
Hall.VI.
XLV.

Nucula ventricosa. (Hall, 1858, Geol. of Iowa, part II, p. 716, pl. 29, figs. 4, 5 = ? *Nucula tumida*, Phillips.) Collett's Indiana Report of 1881, page 371, plate 42, figs. 9, 10. Report of 1883, page 146, plate 27, figs. 9, 10, *ordinary size* of the specimens found, left side view, and back or hinge view. Surface usually smooth, but concentric striæ generally observable toward the basal margin. Hall. Generally found at roof of Coal M, Ind. In *Ferriferous limestone*, Low. Prod. C. M. Beaver, Lawrence, Mercer, Butler Cos., Pa. Q, 62, 200; Q2, 47, 106; Q3, 25; V, 147. In *Decker's creek limestone*, under Mahoning SS. L, 36. In *Crinoidal limestone*, 250′ beneath Pittsburgh coal. Q, 30; L, 35.—*XIII*, *XIV*.



Nucula ———. Rogers, Geology of Pennsylvania, 1858, page 833, fig. 690. Coal measures. *XIII*.

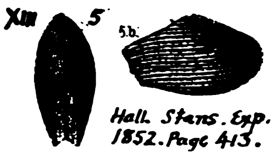


Nucula ——— ? A small species in the *Portage* beds of Blair county. T, p. 30.—*VIII f*.

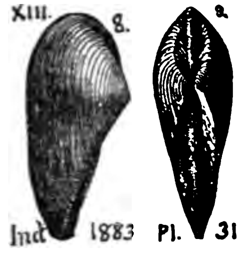
Nucula ——— ? In bed No. 45 of the Olive shales on the Pa. R. R., below Huntingdon. T3, p. 264.—*VIII g*.

Nucula ——— ? Abundant in *Chemung* beds, 50′ to 100′ above the Stony Brook group. G7, p. 73; in bed 41 of Section 63, G7, p. 197. Two *new species* in beds 5, 7 and 9, of the section at Bloomsburg, Columbia Co., Pa. G7, p. 290.—*VIII g*.

Nucula ——— ? Seen in the lowest layer of the *Great Limestone* on the Chartiers Valley railroad at Cannonsburg, Washington Co., Pa. K3. p. 307 and 310.—*XV*.

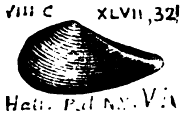


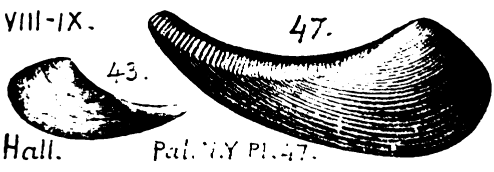
Nuculana arata. (*Nucula arata*), Hall, Stanbury's Expedition to Great Salt Lake, 1852, page 413, plate 2, fig. 5 *b*, right valve, front end broken off; *a*, hinge, beaks, back lunule; a beautiful shell, occurring with *Terebratulæ*, *Spiriferæ* and *Productus* in the Western *coal measures*. In S. W. Pennsylvania recognized by J. J. Stevenson in the *Decker's creek shale*, under the Mahoning sandstone, at Morgantown, W. Va. Report L. p. 36.—*XIII.*



Nuculana bellistriata. (*Leda bellistriata*, Amer. Jour. Sci. Vol. 25, 1858, page 261.) Collett's Indiana Report of 1883, page 146, plate 31, figs. 8, 9, *somewhat enlarged*, left side and hinge views. Occasionally nearly an inch long, but usually much less. Roof shales of coal M, in several counties, Ind. In Pennsylvania, occurs in the *Ferriferous limestone* of Mercer and Butler counties, Q3, p. 25, V, p. 146. Also, in the *Black Fossiliferous limestone* of the Barren measures of Fayette Co. K3, p. 310: L, p. 35.—*XIII, XIV.*

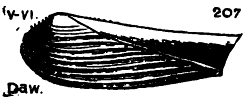
Nuculana (*Leda*) **diversa**, Hall, Vol. 5, part I, page 329, plate 47, fig. 32 (selected from figs. 31 to 37). Claypole's specimen 5–89, in the *Hamilton* beds of Perry Co., Pa. Report F2, preface, p. xiv.—*VIII c.*





Nuculana (*Leda*) **rostellata.** Hall, Pal. N. Y., Vol. V, part I, plate 47, fig. 43, *enlarged twice*, the common form; fig. 44, *enlarged three times* (copied by Van Iterson). Recognized in Claypole's specimens 103–1, 2, 4, Penn township, Perry Co., Pa., *Uppermost Chemung beds.* *VIII, IX.*

Nuculana ——— ? In *Chemung* bed No. 41 of Section 63, N. Br. R. R. from Hartville to Wapwallopen, Luzerne Co., Pa., 1000 feet above the *Genesee slate.* G7, p. 197.—*VIII g.*



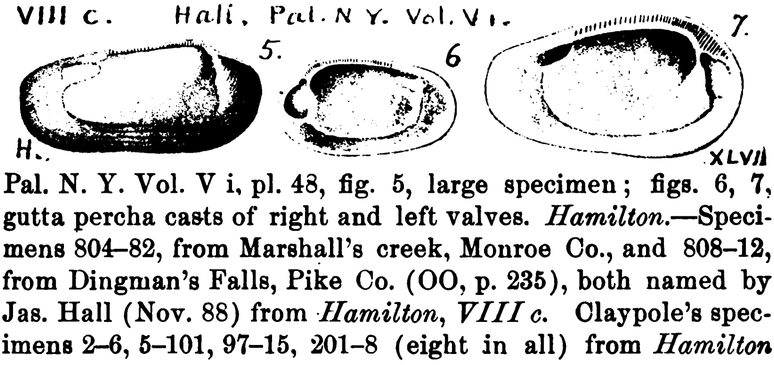
Nuculites (*Orthonota*) **carinata,** Hall. Dawson's Acad. Geol. 1868, p. 602, fig. 207; sharp keel extending from the beak obliquely to back base; space in front of the keel marked by distinct, raised lamellose striæ, and intermediate finer ones; space between this and hinge line smooth and slightly depressed; hinge line forward of beak has six or seven crenulations; strong clavicle curves gently backward.— *V?*

Nuculites elongatus. In the *Hamilton upper shales* at Huntingdon, Pa. T3, p. 109. *VIII c.*

Nuculites faba. See **Modiolopsis faba.** *II c, III b.*

Nuculites inflata. See **Cypricardinia inflata.** *II c.*

Nuculites oblongatus, Conrad, Ann. Rt. N. Y. 1841. Hall,

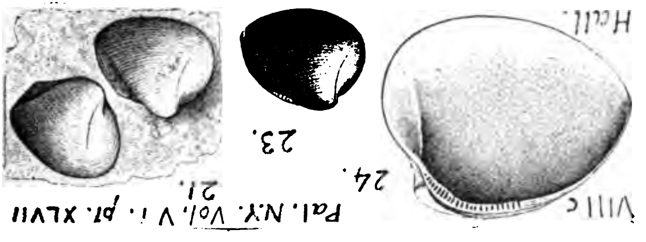

VIII c. Hall, Pal. N. Y. Vol. V i.
5.
6
7.
H.
XLVII

Pal. N. Y. Vol. V i, pl. 48, fig. 5, large specimen; figs. 6, 7, gutta percha casts of right and left valves. *Hamilton.*—Specimens 804–82, from Marshall's creek, Monroe Co., and 808–12, from Dingman's Falls, Pike Co. (OO, p. 235), both named by Jas. Hall (Nov. 88) from *Hamilton, VIII c.* Claypole's specimens 2–6, 5–101, 97–15, 201–8 (eight in all) from *Hamilton beds* in Perry county, Pa. *VIII c.*

Nuculites poststriata. **Lyrodesma poststriatum.** *II b.*

Nuculites scitula. See **Cleidophorus planulatus.** *III a.*

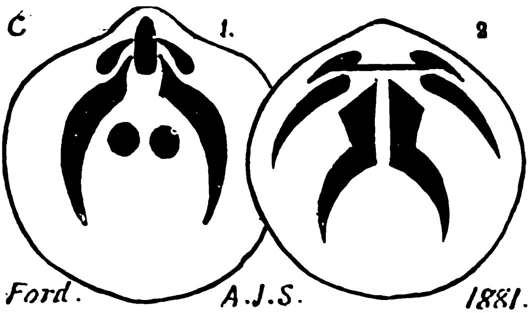
Nuculites triqueter, Conrad, An. Rt. N. Y. 1841. *Hamilton.* Hall, Pal. N. Y. Vol. V, part I, plate 47, fig. 21, usual character; 23, cast of left valve; 24, gutta percha impression.—Spec. 2–21, White found it in *Hamilton upper shales* (50′ beneath Tully limestone,) Huntingdon Co., Pa. T3, p. 109.—*VIII c.*

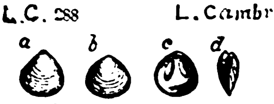

21
23.
24.
Pal. N. Y. Vol. V. i. pl. XLVII
Ham.
VIII c

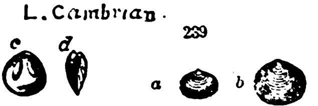
Nuculites ——— ? In *Hamilton shale* near Union schoolhouse, St. Clair, Bedford Co., Pa. T2, p. 129.— *VIII c.*

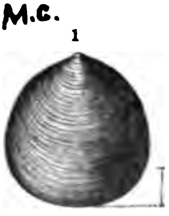
Nuculites ——— ? Sp. 883–8 (showing crenulations of hinge line) from Tioga Co., N. Y., in *Chemung*, *VIII g.*

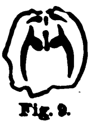
Obolella chromatica, Billings, Pal. Foss. Vol. I, 1861, *Potsdam formation.* Walcott, Jour. A. S. Vol. 29, Feb. 1885, p. 116, reproducing Ford's figures (Am. Jour. Sci. Vol. 21, 1881, p. 131.) Fig. 1, plan of interior of dorsal valve; fig. 2, ditto of dorsal valve. Geol. Can. 1863, page 284, fig. 288, *a*, ventral valve; *b*, dorsal; *c*, interior of ventral? with muscular scars; *d*, outline restored from detached valves. (The two figures 239 *a*, *b*, are of *Obolella pretiosa*, which see below.) *Quebec group*, called "*Potsdam*" by Logan. *I.* Walcott's Bull. 30, U. S. G. S. page 112, plate XI, fig. 1, dorsal valve; fig. 1 *a*, ventral valve; fig. 1 *b*, interior of dorsal valve; *all three enlarged about three times.* Inserted small figs. 9 and 10, are from page 110, describing the genus *Obolella.—Lower Cambrian* formation, at L'Anse on Loup, Straits of Belle Isle (north side).—(See Billings, Geol. Vt. 1861, pl. 2, figs. 346 *a* to *d*, 1861; Geol. Can. 1863, figs. 288 *a* to *d*; Pal. Foss. 1865, pl. 1, figs. 7 *a* to *d*; A. J. S. 1876, p. 176, figs. 1 to 4 *d*. See also Ford, 1881, in A. J. S. Vol. 21, p. 133, figs. 3, 4.)—*L. C.*

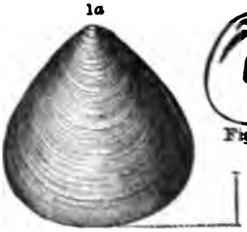


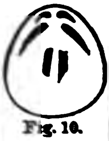




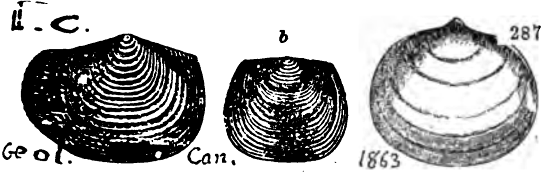




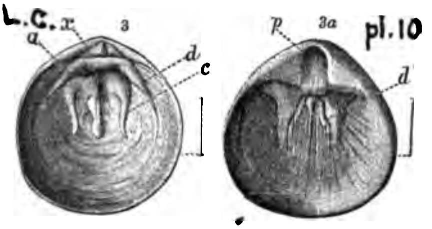




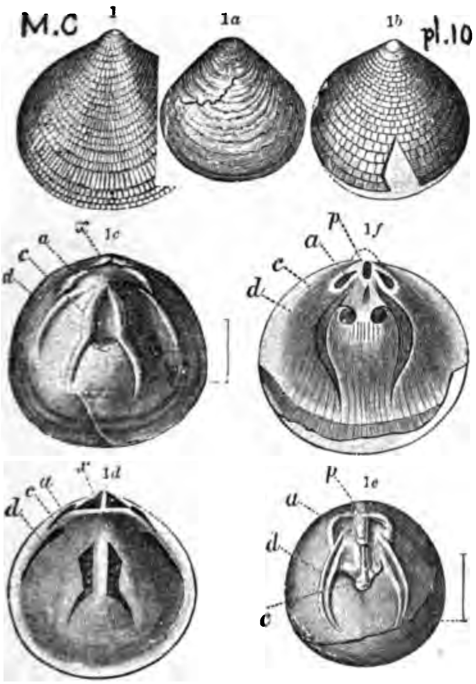
Obolella cingulata, Billings. Now **Kutorgina cingulata,** Walcott. Pal. Foss. Vol. 1, 1861. Geol. Can. 1863, p. 284, fig. 287, *a*, ventral valve; *b*, dorsal valve; *c*, interior of dorsal valve. *Quebec group.* (Walcott) *Lower Cambrian. L. C*



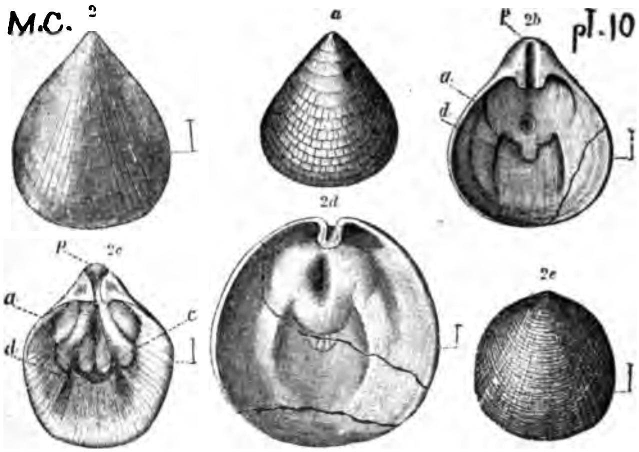
Obolella circe. Walcott. Bull. No. 30, U. S. G. S. page 118, plate 10, fig. 3, inside of dorsal, and fig. 3 *a*, inside of ventral (?) valves. —See Billings, Can. Nat. 1872, Vol. 6, p. 219.—Georgian limestone, below Quebec. *L. C.*



Obolella crassa, Ford. (*Orbicula crassa*, Hall, Pal. N. Y. Vol. 1, pl. 79, fig. 8 *a*.—*Avicula desquamata*, Hall, Pal. N. Y. Vol. 1, pl. 80, fig. 3 *a*, *b*.—*Dicolomus crassa*, Hall, 23d An. Rt. N. Y. p. 246, pl. 13, figs. 6 to 9.—*Obolella crassa*, Ford, Am. Jour. Sci. Vol. 2, p. 33, and Vol. 21, p. 131, figs. 1, 2.) Walcott, Bull. No. 30, U. S. G. S. page 114, plate 10, fig. 1, ventral valve, well-preserved inside surface, *enlarged three times ;* 1 *a*, dorsal valve, outer surface exfoliated, *enlarged ;* 1 *b*, dorsal valve with outer surface preserved, *enlarged twice ;*



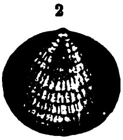
1 *e*, cast of inside of dorsal valve; 1 *d*, diagram of inside dorsal valve (by Ford); 1 *e*, cast of inside of dorsal valve; 1 *f*, diagram of inside ventral valve (drawn by Ford); *a*, cardinal; *b*, central; *d*, lateral muscular scars; *p*, pedicle groove.—Troy, N. Y.; Shodack Landing Quebec. *L. C.*



Obolella gemma. Billings, 1872, Can. Nat. Vol. 6, p. 218, figure 5. Walcott, Bulletin No. 30, U. S. G. S. page 116, plate 10, fig. 2, outside (weathered) of a *ventral* valve, *enlarged;* fig. 2 *a*, another, *enlarged six times;* fig. 2 *b*, inside of another (*a*, cardinal; *d*, lateral; *c*, central muscular scars; *p*, foot groove); 2 *c*, inside of another (differences due largely to poor preservation); 2 *d*, inside of dorsal valve, poorly preserved; 2 *c*, outside of another. (*All enlarged.*) Below Quebec; and near Troy, N. Y. *Lower Cambrian. L. C.*

Obolella labradorica, (**Kutorgina labradorica**), Billings *Iphidea labradorica*, Billings. Pal. Foss. Vol. 1861.—Geol. Can. 1863, page 284, fig. 291, dorsal valve. *Quebec group*, called by Logan, here, *Potsdam. I.* (Walcott has renamed the genus, and placed it in *Lower Cambrian.*) *L. C.*

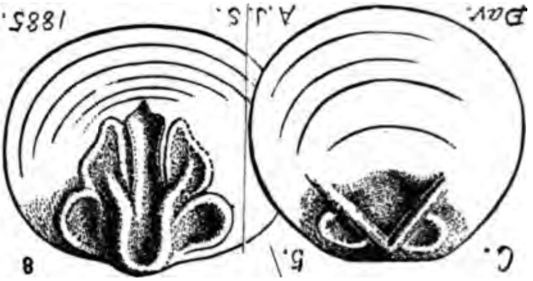
Obolella nitida, Ford, 1873, Amer. Jour. S. [3] Vol. 5, p. 213.—Walcott, Bulletin No. 30, U. S. G. S. page 118, plate XI, fig. 2, dorsal (?) valve, *enlarged five times* (drawing by Ford). *Lower Cambrian* near Troy, N. Y. (Walcott.) *L. C.*



Obolella phillipsia. See **Kutorgina cingulata.** *L. C.*

Obolella pretiosa, Billings. Pal. Foss. Vol. 1, 1862. Geol. Can. 1863, page 230, fig. 239, *a*, *b* (for which see under *Obolella chromatica*, above). *Quebec group*, (Logan).—*L. C.*

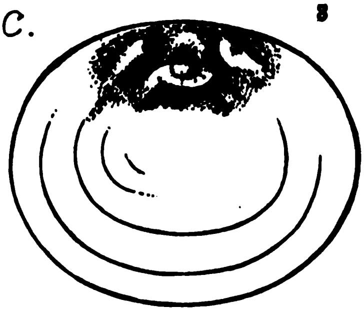
Obolella sagittalis Davidson. Now **Linnarssonia sagittalis.** Walcott, Am. Jour. Sc. 1885, p. 116, from Davidson, fig. 5, cast of interior of ventral, and fig. 8, of dorsal valve.



Obolella transversa, Hartt. Now **Linnarssonia transversa.** Walcott. Am. J. S. Vol. 29, Feb. 1885, p. 116, fig. 3, outline of interior of ventral valve, apex of triangular projection in front of the hole (foramen) broken off; fig. 4, cast of interior of ventral valve; fig. 6, interior of flattened dorsal valve: fig. 7, cast of an uncompressed dorsal valve. From the

C.

3



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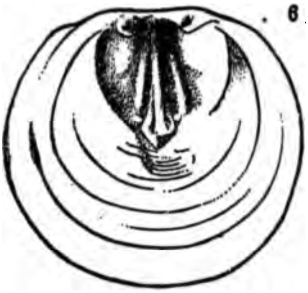

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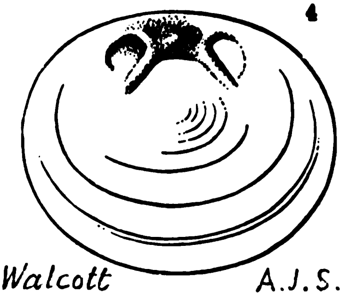

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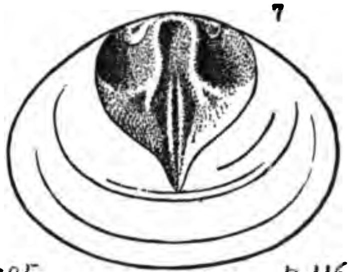
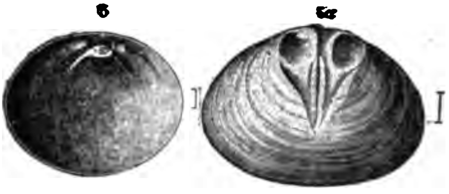


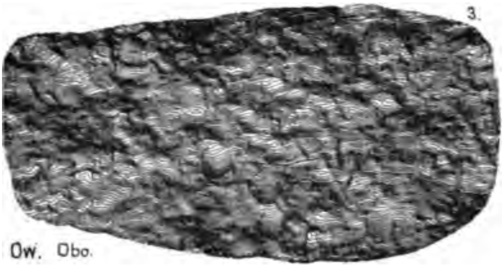
Walcott A.J.S. 1885. p.116

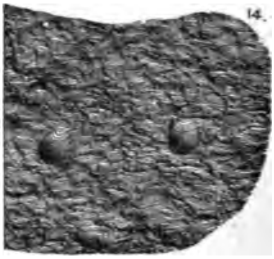
St. John's group, N. B., and Eureka district, Nevada. (Pal. Eureka Dist. Mon. 8, U. S. Geol. Survey.) *Cambrian. C.*

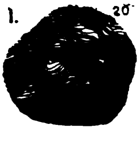
Obolella transversa, Hartt. Dawson, Acad. Geol. 2d Ed. 1868, p. 644. Walcott, Bulletin No. 10, U. S. G. S. page 16, plate 1, fig. 5, inside ventral valve, *enlarged eight times ;* 5 *a*, cast of inside dorsal valve, *enlarged six times* —St. John, N. Brunswick. *M. C.*



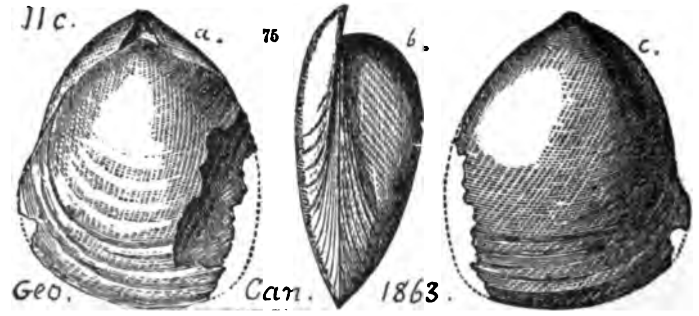
Obolus (*Apollinus ?*) Owen. Geol. Wisc., Iowa and Minn., 1852, pl. 1A, figs. 20, 15, 11, (9 omitted), from member *b* of grits, mouth of Black river. Supposed *Potsdam SS.—I.* To this I add Owen's beautiful figures of slabs of Obolus grit from the same locality, to show the grouping of the little shells in the rock, pl. 1B, figs. 3, 14.—*I.*







Obolus canadensis, Billings. (*Dinobolus canadensis,*



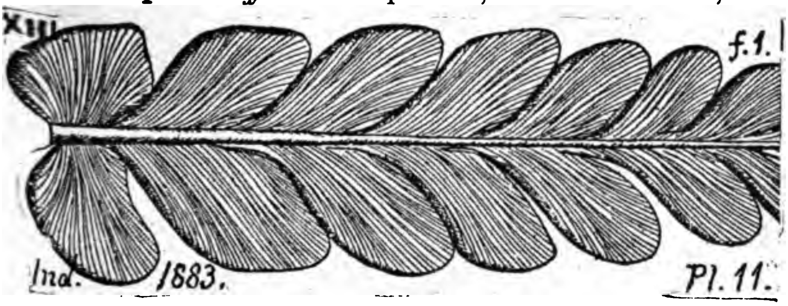
Billings, Report of Progress, Canada Survey, 1857, *Black river group.*) Geol. Can. 1863, page 142, figs. 75 *a*, dorsal view showing area of ventral valve; *b*, side view; *c*, dorsal valve of broad, oval variety. *Trenton II c.*

Obolus ——— ? Found by Emmons in the white, friable shales of Virginia, with *Lingula striata*, *Orbicula excentrica*, &c. Am. Geol. I, ii, p. 113, pl. 1, fig. 10.—*I? C?* The age of these shales are unknown to me.

Obolus ——— ? Rogers, page 817.—*Potsdam formation;* probably one of the *Obolellas*, or *Kutorginas.* The same is probably true of Owen's undetermined *Oboli.*—*I? C?*

Odontocephalus selenurus. See **Dalmanites selenurus.** *VIII a.*

Odontopteris *affinis.* Lesquereux, Coal Flora of Pa., Vol. 3, 1884, page 742, plate 97, fig. 4. Rare, in Mazon creek nodules, Ill.) Collett's Indiana, 1883, page 54, plate 11, fig. 1; close to *Odontopteris subcuneata.*—*Coal measures. XIII.*

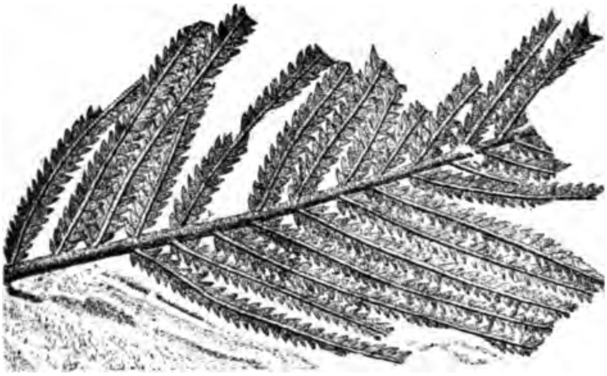

XIII
f.1.
Ind. 1883.
Pl. 11.

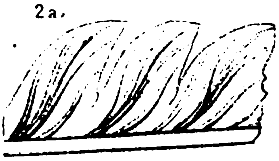
Odontopteris brardii. Found in the Darlington bed at Cannelton, Beaver Co., Pa. Q, 54.—*XIII.*

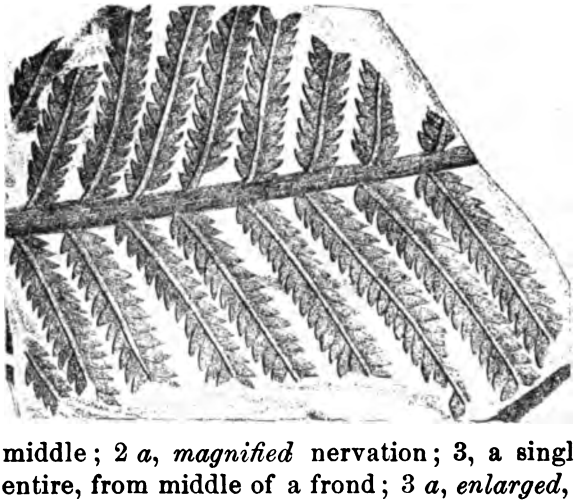
Odontopteris britannica. Gutbier, Abdr. p. 68, plate 9, figs. 8 to 11; Weiss, Flor. Foss. plate 1, fig. 2. Lesquereux found exactly similar specimens (quite unlike *O. schlotheimii*, to which Schimper refers *O. brit.*) at Cannelton, Pa., and St. Clairsville, Ohio, in Lacoe's collection at Pittston, Pa. Kittanning group of Allegheny river coal series.—*XIII.*

Odontopteris gracillima, Newberry. Pal. Ohio, Vol. 1, 1873, page 382, plate 46, fig. 1, part of summit of frond; 2,

Odontopteris gracillima *Continued.*



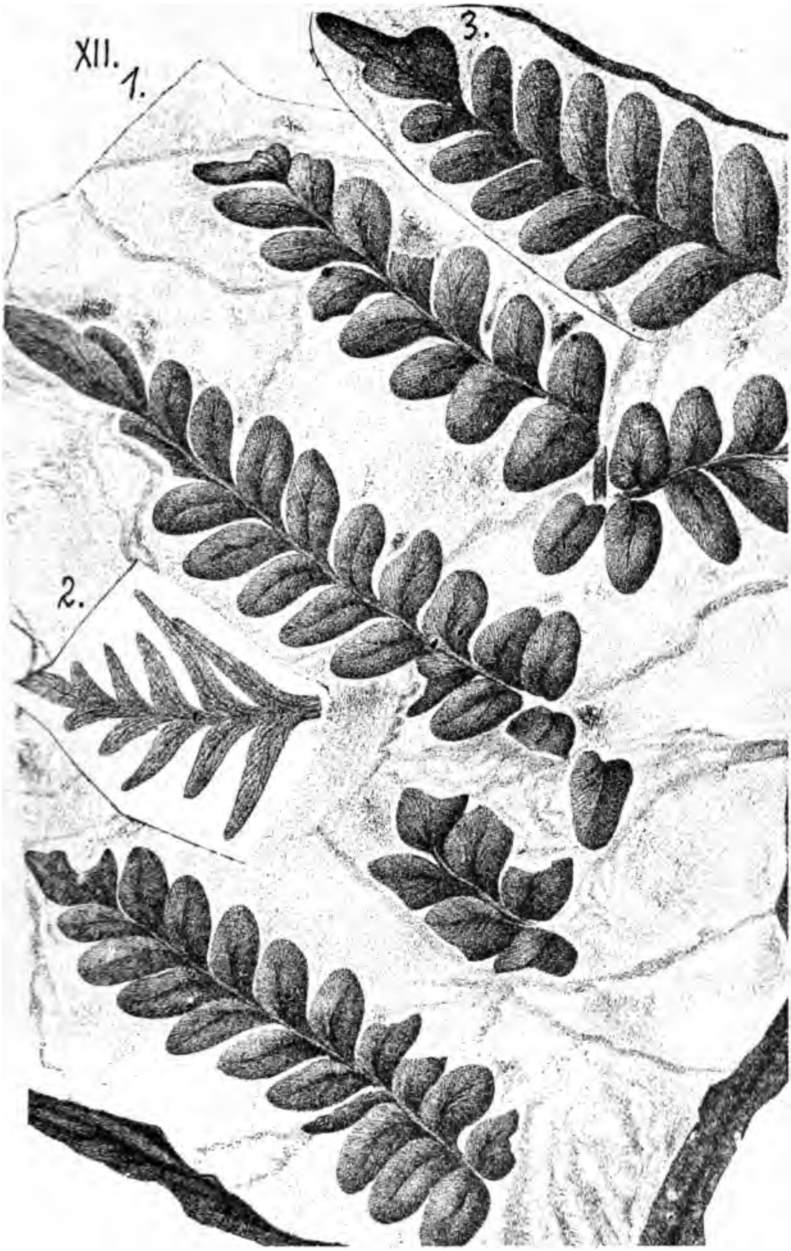


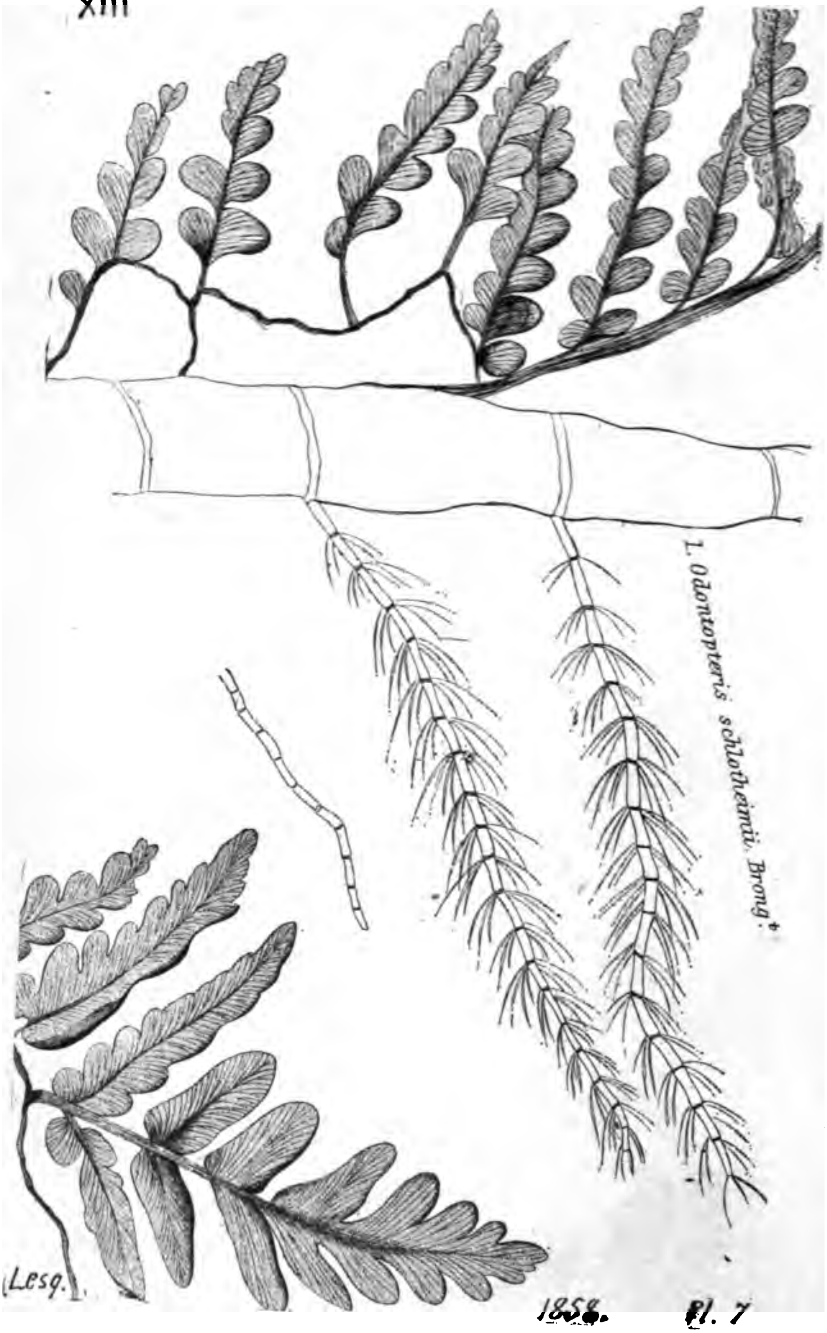


middle; 2 *a*, *magnified* nervation; 3, a single pinna, nearly entire, from middle of a frond; 3 *a*, *enlarged*, to show nervation. Roof shales of *Coal No. 1*, Youngstown, O.—*XII.*

Odontopteris neuropteroides, Newberry. Pal. Ohio, Vol. 1, 1873, page 381, plate 47, fig. 1, part of frond with basal pinnules like *Neuropteris;* figs. 2, 3, pinnæ having character

Odontopteris neuropteroides *Continued.*



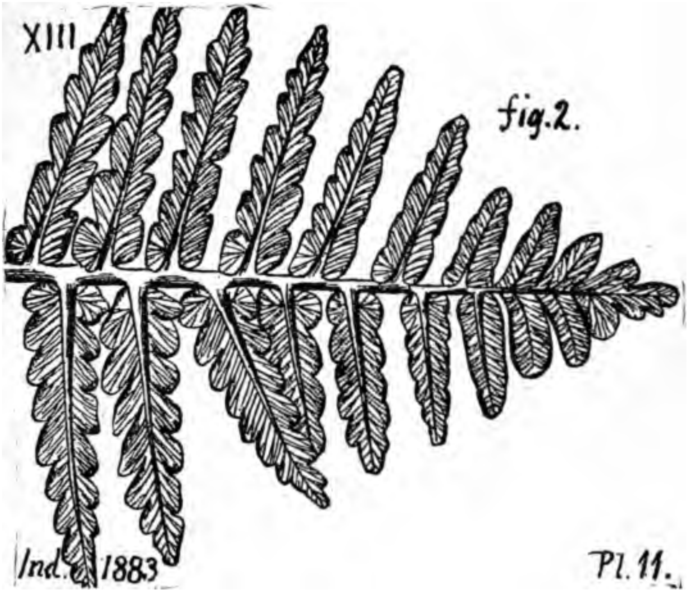


1. *Odontopteris schlotheimii.* Brong^{t}.

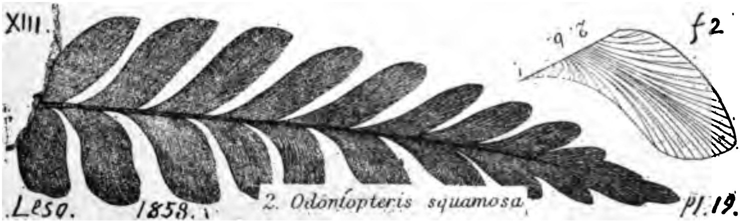
1858. Pl. 7

of *Odontopteris*. Coal No. 1, Ohio.—*Mt. Savage coal* Beaver Co., Pa., Q, p. 68; *Sharon coal* Mercer Co., Q3, p. 160; under Conneconessing L. SS., Lawrence Co., Q2, p. 97. All *XII*.

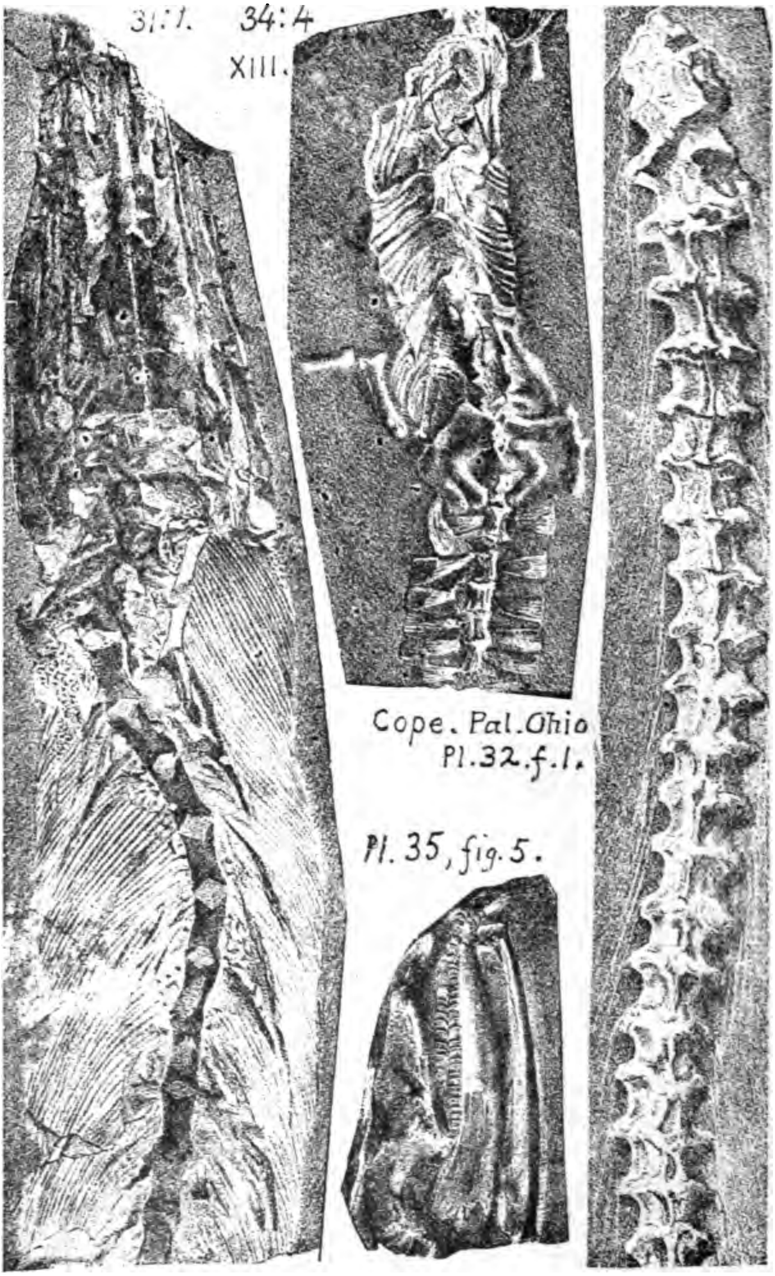
Odontopteris schlotheimii, Brogniart (*Filicites osmundæformis*, and *Filicites vesicularis*, of Schlotheim; ***Weissites vesicularis*** of Gœppert and Geinitz.) Brongniart, pl. 78; Gœpport, pl. 6; Lesquereux, Geol. Pa. 1858, pl. 7, fig. 1; Coal Flora, p. 136, pl. 20, figs. 1, 2; Collett's Indiana Rt. 1883, p. 54, pl. 11, fig. 2. Large specimens found in the New and Tunnel veins, Tremont, Schuylkill Co., Pa.; also in the Pittsburgh bed at St. Clairsville, Ohio; also in shale above the low Morris coal, Ill. Lesq. *XIII*, *XV*.


XIII
fig.2.
Ind. 1883
Pl. 11.

Odontopteris squamosa, Lesq. Jour. Bost. N. H. S., VI,



Œstocephalus remex, Cope. *See page 487.*



31:1. 34:4
XIII.

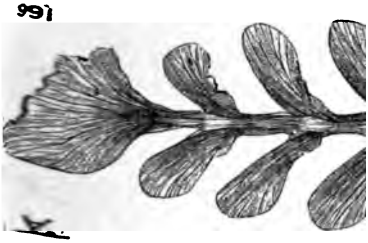
Cope. Pal. Ohio
Pl. 32. f. 1.

Pl. 35, fig. 5.

419. Geol. Pa. 1858, p. 860, pl. 19, figs. 2, 2 *a*. Not *O. brardii;* but near *O. obtusa* (*lingulata*), but end leaflet too large; veins obscured with coal; perhaps *O. laciniata*, found with it, in abandoned anthracite bed on Muddy creek, west of Pottsville. Scarce; found in S. Salem vein, Pottsville.—*XIII.*

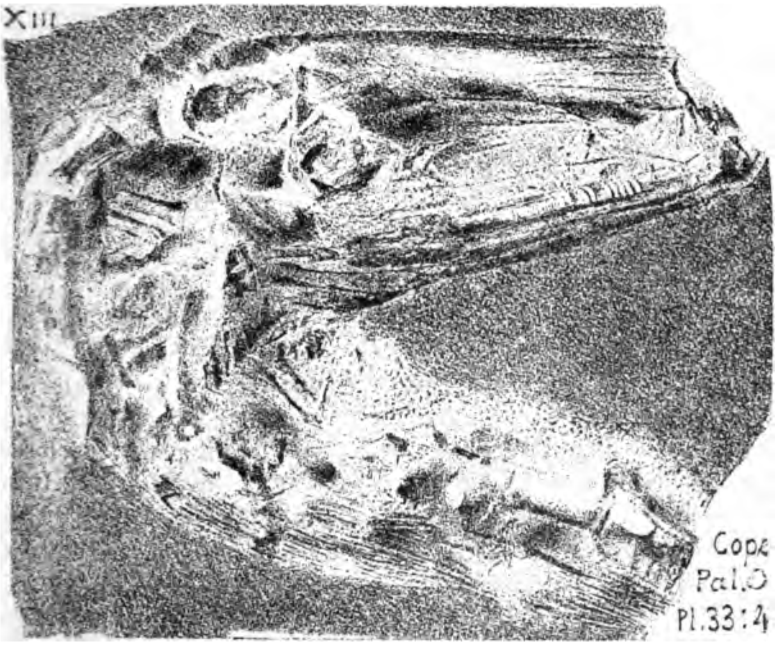
Odontopteris subcuneata. Near *O. affinis*, *XIII.*

Odontopteris subcun (after Bunbury). Dawson's Acadian Geology, 1868, p. 447, fig. 166 A, Nova Scotia *Coal measures. XIII.*—Lesquereux, Coal Flora of Penna., 1880, p. 134, pl. 22, f. 4, 6. Rare species.



Œnites deripiens. See **Worm teeth.** *VI.*

Œstocephalus remex. (*Sauropleura remex*, Cope, Proc.



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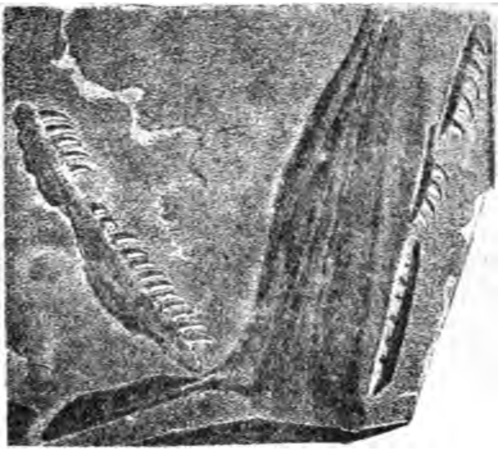
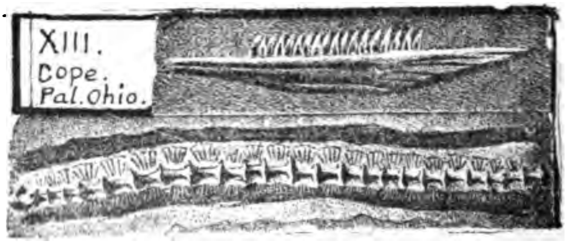
Acad. Nat. Sci. Phila. 1868, *Coal measures.*) Pal. Ohio, Vol. 2, 1875, page 381, 384, wood-cut of caudal vertebræ; plate 27, fig. 5; 31, fig. 1; 32, fig. 1; 33, fig. 2; 34, fig. 4; 35, fig, 5.—*XIII.*

For other figures see page 486.



Cope. Pal. Ohio, II. Pl. XXVII, 5.

Œstocephalus rectidens, Cope. Trans. Amer. Philos. Soc. 1874; Pal. Ohio, Vol. 2, 1875, p. 386, pl. 27, figs. 3, 4. *Coal measures* of Ohio. *XIII.*



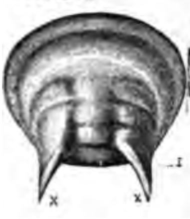
Ogygia ? klotzi, Rominger. Proc. Acad. Nat. Sc. Phil. Jan. 1887, p. 12. pl. 1, f. 1. A fine large trilobite unlike all other Cambrian species; differs from the type of the second fauna in having an ocular ridge extending from the front edge of the eye to the dorsal furrow, beside the glabella. All other parts of the head, thorax and pygidium relate it more closely to *Ogygia* than to any other generic form. The oldest *Ogygia* species (*selwyni*) Salter, in the Welsh *Arenig* rocks, is closer to *O. buchi* of the *Llandeilo* rocks than to *O. klotzi.* "It is unusual that a genus showing so little variation from *Ogygia* should occur at a much lower horizon in an area separated by over 5000 miles from the area where the species of *Ogygia* flourished at a later period," *i. e.*, Wales and the Rocky Mountains. Walcott, in Amer. Jour. Sci. Sep. 1888, p. 166.—*Middle Cambrian, M. C.*

Ogygia serrata, Rominger. Proc. Acad. N. S. Phil. 1887, pl. 1, figs. 2, 2 *a*. See **Olenoides nevadensis,** Meek. Walcott, in Amer. Jour. Sc. Sep. 1888, p. 165.—*Middle Cambrian*, *M. C.*

Olenellus. Genus discussed by Walcott. U. S. Geol. Sur. Bull. 30, p. 162. *Lower Cambrian. L. C.*

Olenellus asaphoides. Ford, (1871, Am. Journ. Sc. Vol. 2, p. 33; 1877, Vol 13, p. 267; 1878, Vol. 15, p. 129; 1881, Vol. 22, p. 250; *Elliptocephala asaphoides*, Emmons, 1844, Taconic System, p. 21, figs. 1, 2, 3; Agriculture of N. Y., 1846, Vol. 1, p. 65, figs. 1, 2, 3. *Olenus asaphoides*, Hall, 1847, Pal. N. Y., I, pl. 67, fig. 2 *a* to *e*; *Elliptocephalus asaphoides*, Emmons, 1849, Proc. A. A. A. S., I, p. 18; Amer. Geol. Vol. 1, part 2, p. 114, figs. 1, 2, 3; pl. 1, fig. 18. *Paradoxides asaphoides*, Emmons, 1860, Manual of Geol. p. 8, fig. 70, etc.) Walcott, Bull. 30, U. S. G. S. p. 168, pl. 17, fig. 4, tail-spine (telson) found with fragments of the animal at Troy; fig. 5. youngest stage of development yet found by W. only $\frac{4}{5}$ mm long; fig. 6, a slighly larger specimen, 1.75 mm.; fig. 7, adult form (Ford); fig. 8, young form (Ford); fig. 10, chin piece (hypostoma) supposed to belong to this species; pl. 30, fig. 3, embryo, circular, etc., *enlarged three and a half* (Ford); fig. 3 *a*, another phase, *enlarged five times* (Ford); fig. 3 *b*, normal adult head piece, *enlarged twice* (Ford); pl. 25, fig. 8, *enlarged* drawing of a piece of a free cheek.—*L. C. Lower Cambrian*

M.C. 5



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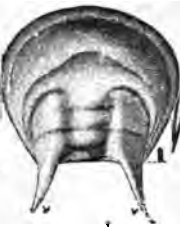

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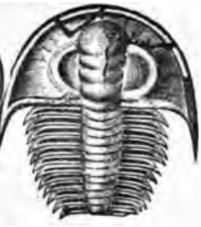
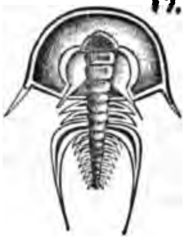


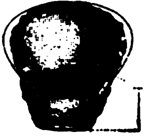
8 17



3 17

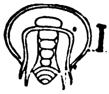
8 16

10 17

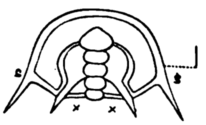


M.C.

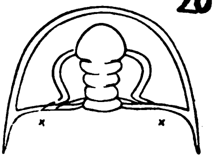
3



3a

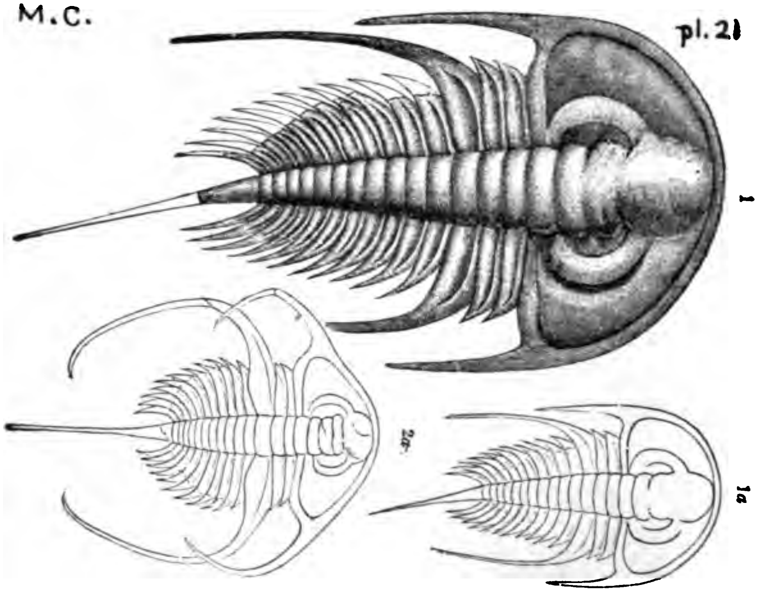


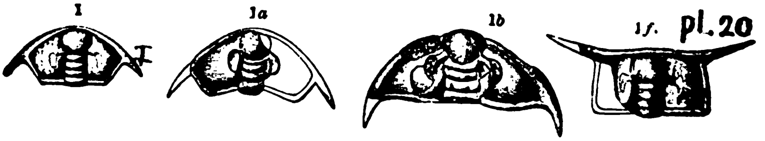
3b 20



(Georgian) limestones at Troy; at Shodack Landing; and at Reynold's Inn, N. E. of Bald Mtn., Wash. Co., N. Y.—Note. The *fragments* of this species cannot be distinguished from *fragments* of *Olenellus thompsoni* and *Olenellus gilberti*, unless the chest joints (thoracic segments) are got.

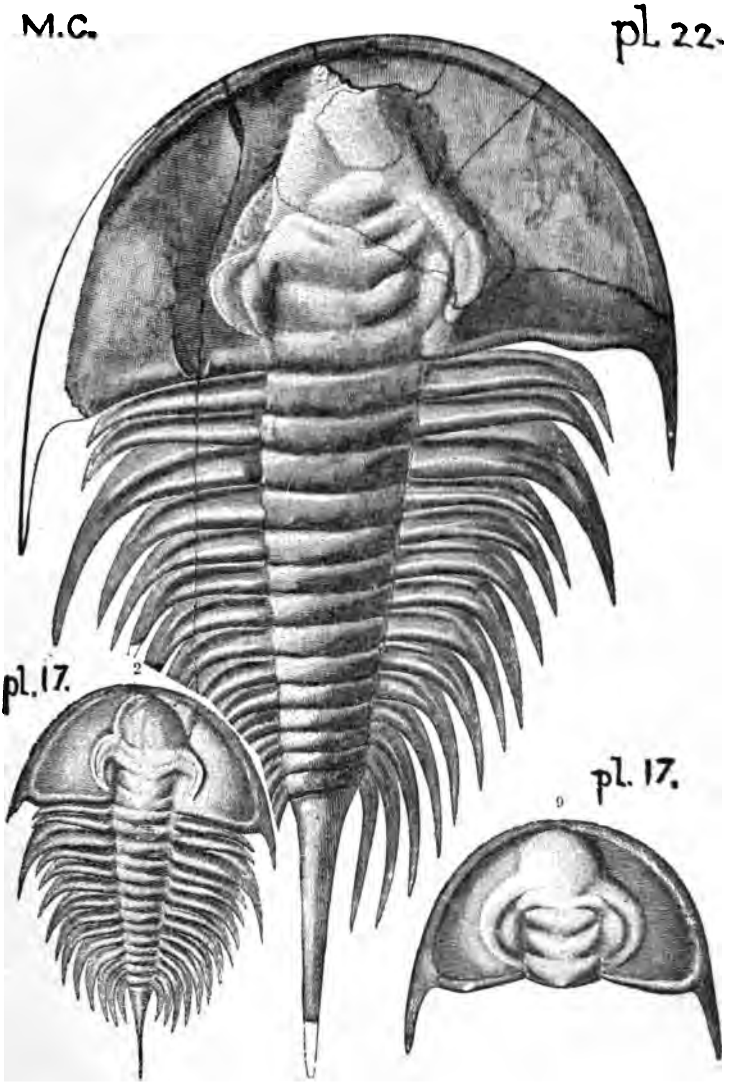
Olenellus gilberti, of the Rocky Mountains, has not been





found on the Atlantic side of the continent. Its head exhibits a large range of variation. It has been collected from limestone, clay and sand strata, through a section 50′ to 300′ high, overlying 3000′ of Wasatch Mountain red-brown quartzite, of Middle Cambrian age; in Nevada and Utah in various localities; and in British Columbia. See Walcott's Bulletin No. 30, U. S. G. S. p. 173. From his numerous figures on plates 18, 19, 20 and 21, I have selected pl. 21, fig. 1, normal form of species, except in the unusual prolongation of the third segment, *enlarged twice;* fig. 1 *a*, shows the actual size; fig. 2 *a*, the actual size of another specimen broadened by pressure in the movement of the rock masses; plate 20, fig. 1, smallest specimen of head collected. Note the distance of the eyes from the central head piece (glabella); 1 *a*, larger specimen, eyes close to glabella, cheek points extended; 1 *b*, eyes united to glabella by ridges; 1 *f*, extreme projection of cheek points.

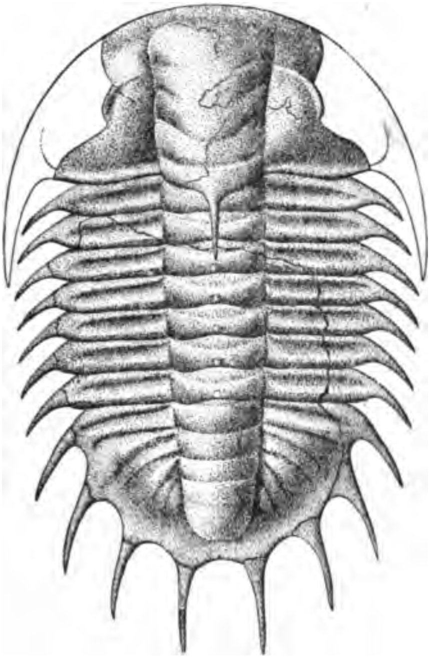
Olenellus thompsoni. Hall, (1862. 15th An. Rt. p. 114.


M.C.
pl. 22.
pl. 17.
2
pl. 17.
9

Olenus thompsoni, Hall, 1859, 12th An. Rt. p. 60, fig. 1 : Pal. N. Y. III, p. 525. *Barrandia thompsoni*, Hall. 1861, 13th An. Rt. *Paradoxides thompsoni*, Emmons, 1860, Man. Geol. Barrande, Bull. S. G. d. F. 18, 5, 6 ; *Paradoxides macrocephalus*, Em. 1860, Man. Geol. fig. 70 ; *Paradoxides asaphoides*, Em. on preceding page, etc.) Walcott, Bull. No. 30, U. S. G. S. page 167, pl. 17, fig. 2, entire specimen from Parker's quarry shales ; fig. 9, very perfect head from mag. lime. Swanton, made perfect from other specimens. (Figs. 1, 4, omitted.) Plate 22, fig. 1, nearly entire specimen from Parker's quarry. (Plate 23 omitted.)—*Lower Cambrian* (Georgian) formation, Vermont. *L. C.*

Olenellus vermontana. See **Mesonacis vermontana.** *L. C.*

Olenoides curticei, Walcott, MSS. from the Cambrian of Coosa Valley, Alabama. This beautiful figure, drawn in Washington, was generously communicated to me, January 24, 1889, in advance of the publication of his manuscript description. "The horizon is not stratigraphically determined, but I think it will be found to be *Middle Cambrian*." (W.)

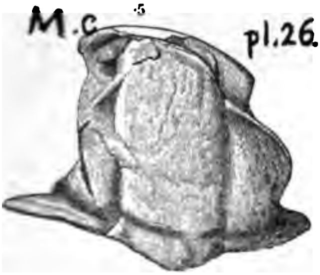


Olenoides flagricaudatus (near *Dorypyge*) White, species. See **Zacanthoides flagricaudatus**, Walcott, in Amer. Jour. Sc. Sep. 1888, p. 165.—*Middle Cambrian*, *M. C.*

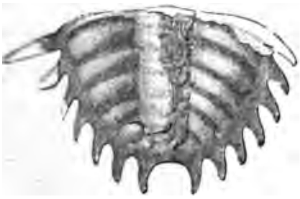
Olenoides levis, (near *Dorypyge*) Walcott. See **Zacanthoides levis,** Walcott, Amer. Jour. Sc. Sep. 1888, p. 165.—*Lower Cambrian*, *L. C.*

Olenoides (?) **marcoui.** (*Dikellocephalus? marcoui*, Whitfield, 1884, Bull. A. M. N. H. I. p. 150, pl. 14, fig. 7.) Walcott, Bulletin No. 30, U. S. G. S. p. 186, pl. 26, fig. 5, head, and 5 *a*, tail, from Parker's quarry.—*Lower Cambrian* (*Georgian*) formation of Vermont; also below Quebec.

M.C 5 pl.26



5a



Olenoides nevadensis, Meek, sp. (*Ogygia serrata*, Rominger, Acad. N. S. Phil. Jan. 1887.) Walcott, Amer. Jour. Sc. Sep. 1888, p. 165.—*Middle Cambrian*, *M. C.*

Olenoides quadriceps, Hall and Whitfield, spec. See Walcott, Amer. Jour. Sc. Sep. 1888, p. 165.—*Middle Cambrian.*

Olenoides spinosus (near *Dorypyge*) Walcott. See **Zacanthoides spinosus,** Walcott, Amer. Jour. Sc. Sep. 1888, p. 165. —*Middle Cambrian*, *M. C.*

Olenoides typicalis (near *Dorypyge*) Walcott. See **Zacanthoides typicalis,** from Northern Alabama. Walcott in Amer. Jour. Sci. 1888, p. 165.—*Middle Cambrian*, *M. C.*

Olenoides wahsatchensis, Hall and Worthen. See Walcott's paper in Amer. Jour. Sc. Sep. 1888. p. 165.—*Middle Cambrian*, *M. C.*

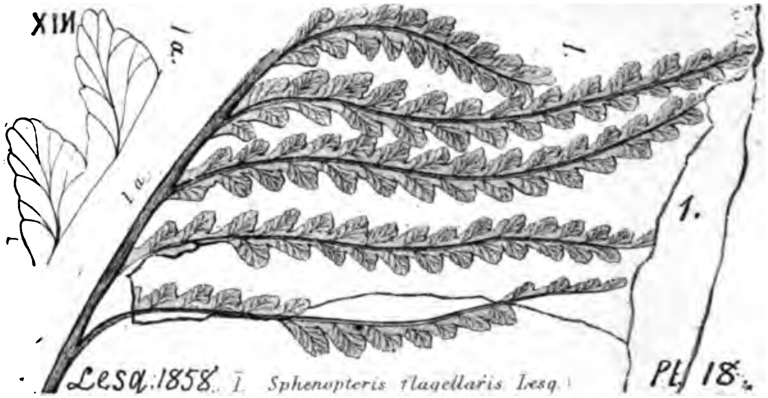
Olenus asaphoides. See **Olenellus asaphoides.** M. C.

Olenus holopyga. See **Bathynotus holopyga.** M. C.

Olenus thompsoni. See **Olenellus thompsoni.** M. C.

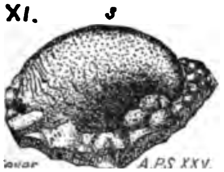
Olenus vermontana. See **Mesonacis vermontana.** M. C.

Oligocarpia (*Sphenopteris*) **flagellaris.** Lesq. Geo. Pa. p. 862, pl. 18, fig. 1, 1*a*, from the South Salem anthracite bed at Pottsville, Pa. Coal Flora, p. 267. No other specimen of this species had been found by Lesquereux up to 1880.—*XIII.*



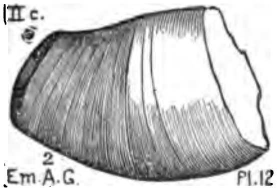
Olivanites angularis. See **Nucleocrinus angularis.**

Ollacrinus tuberosus. L. and Cass. Keyes, Amer. Philos. Society, Phila. Vol. 25, No. 128, 1888, p. 242, fig. 3, growing on *Platyceras equilaterum. Subcarboniferous limestone, XI.*

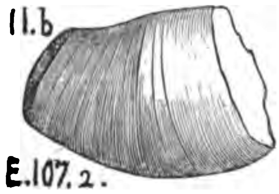


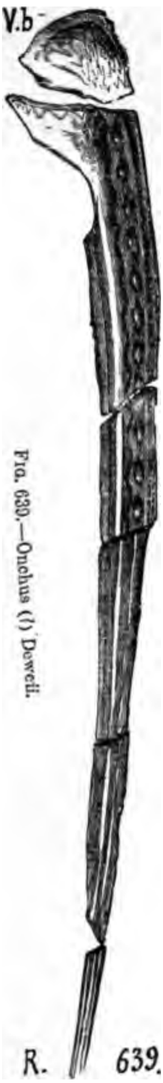
Onchus deweyi, &c. *See page 495.*

Oncoceras constrictum. (Hall, Pal. N. Y. Vol. 1, 1847. Trenton and Black river beds.) Emmons, Am. Geol. Vol. 1, p. 148, part 2, pl. 12, fig. 2. Shell short, narrowed near the mouth, and rapidly tapering towards the other end, where it is always imperfect, and apparently cut or broken off. *Trenton limestone.—II c.*


II c.
2
Em. A. G.
Pl. 12

Oncoceras trentonense. *Cyrtoceras trentonense*, Emmons, Geol. Second District, N. Y. 1842, p. 296, fig. 107, 2. *Trenton.* (Transferred hither from page 181 of this Dictionary, in deference to R. P. Whitfield's MS. corrections, Feb. 1889.)—*II c.*





V.b

R. 639.

FIG. 639.—Onchus (?) Deweii.

Onchus deweyi (if a fish spine; but *Ceratiocaris deweyi*, if the spine of a crustacean). Rogers, p. 824, fig. 639, *Salina* formation. (**Onchus**, a genus of Agassiz, Researches sur les poissons fossiles, 1837.)—*V c.*

V.

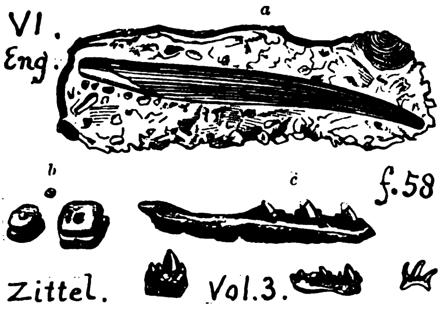
Q.J.G.S. XLI. p.61.

Onchus clintoni, Claypole. Preface to Report F2. Geol. Sur. of Pennsylvania, p. xii, Quar. Jour. London Geol. Soc. Dec. 14, 1884, Vol. XLI, page 61.—*Clinton formation*, Perry Co., Pa. See coprolites of perhaps this species (four) marked 50 *a*–7, in Claypole's collections, OOO.—*V a.*

V. c

Q.J.G.S. XLI. p.61.

Onchus pennsylvanicus, Claypole. Preface to Report F2. Geol. Sur. of Pennsylvania, p. xii.—Quar. Jour. London Geol. Soc. Vol. XLI, p. 61. *New Bloomfield sandstone*, Perry Co., Pa., at the top of the *Salina shale*. A small, fluted fish spine, described in the American Naturalist, Dec. 1884, p. 1222.—*V c.*



VI. Eng.

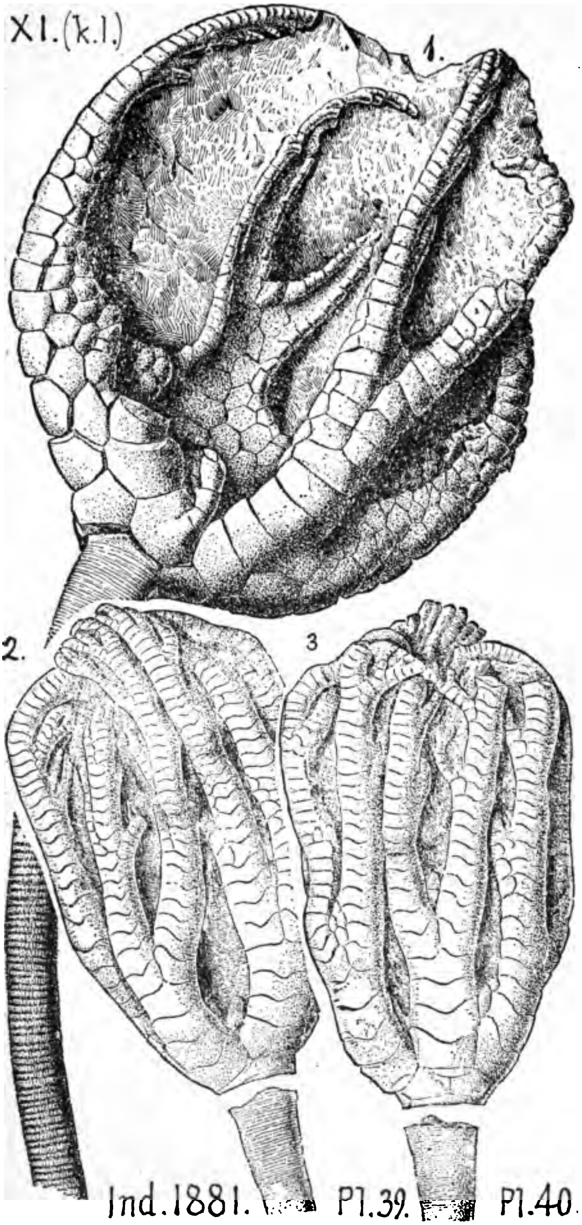
f. 58

Zittel. Vol. 3.

Onchus tenuistriatus. (Agassiz.) Zittel's handbuch, Vol. 3, p. 64, fig. 58 *a*, a spine from the *Ludlow* formation of England; to compare with **Onchus pennsylvanicus** of Claypole.

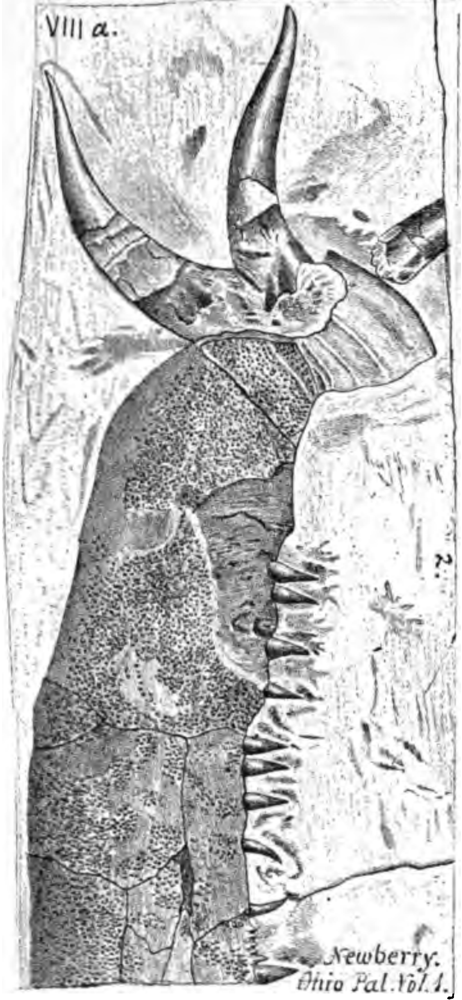
Onychocrinus ramulosus. (Lyon & Casseday.) Collett's Indiana Report of 1881, p. 366, pl. 39, figs. 2 and 3, which I have combined with figure of *O. exsculptus* on page 495; both found at Crawfordsville, Ind. *XI.*

Onychocrinus exsculptus. (Lyon & Casseday, 1860, Am. Jour. Sci. Vol. 29, p. 78.) Collett's Indiana Report of 1881, p. 365, pl. 40, fig. 1, *natural size*, side view of a partially crushed, imperfect head of stone-lily, with broken arms and stems. — Subcarboniferous (Keokuk limestone) formation. *XI.*

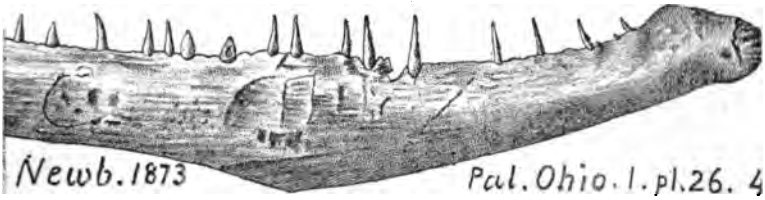


Ind.1881. Pl.39. Pl.40.

Onychodus sigmoides. (Newberry, Pal. of Ohio, Vol. 1, 1873, p. 299, pl. 27, fig. 2, (but only the front half of it) the outer side of a jaw a foot long, (natural size in the original, but *reduced* in the proportion of 5½ to 4 in this cut) showing its ornamented surface, and three of the series of *large* teeth, nearly in their proper position in the lifetime of the fish. Delaware, Ohio. *Corniferous limestone* (*Upper Held.*) *formation*, *VIII a.* Plate 26, f. 4, shows part of the jaw of a small fish of the same species, *natural size;* and f. 3, six of the seven hornlike teeth set for offense and defense, on the front line where the jaws met.

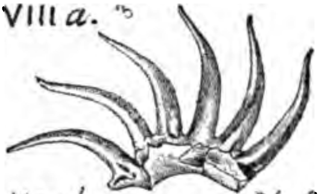

VIII a.
2
Newberry.
Ohio Pal. Vol. 1.

4



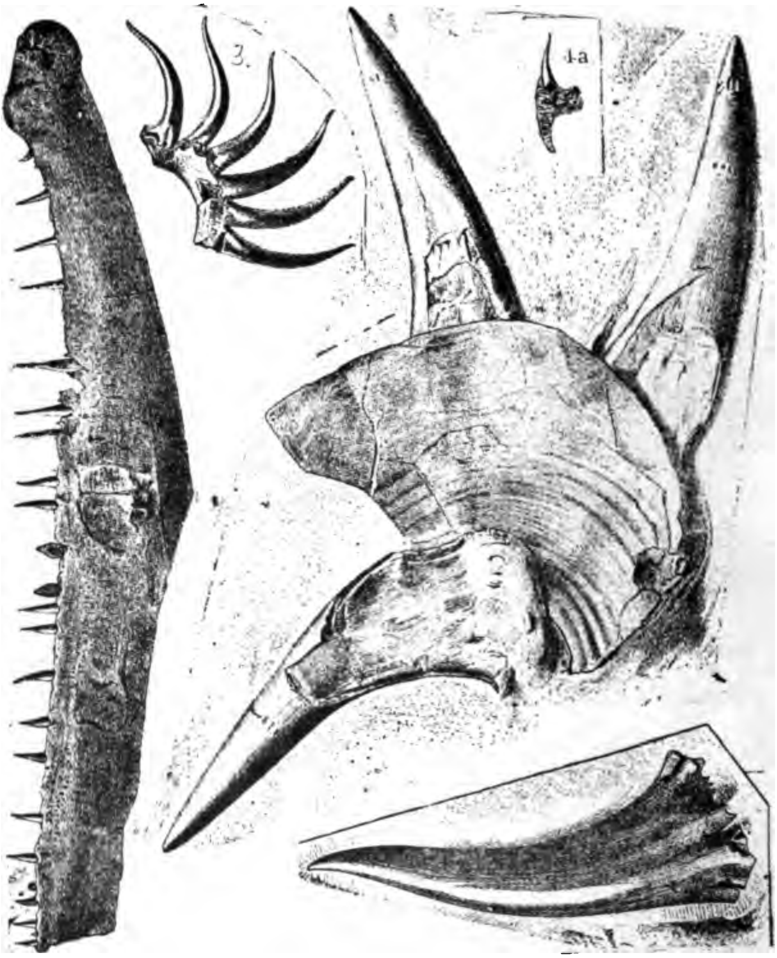
Onychodus sigmoides. Newberry.

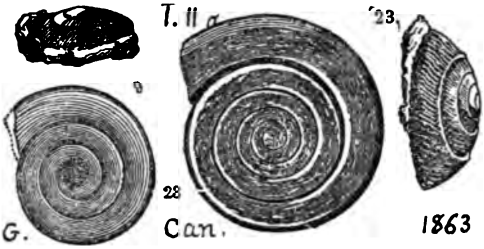
VIII a.



Newb. pl.26. 3

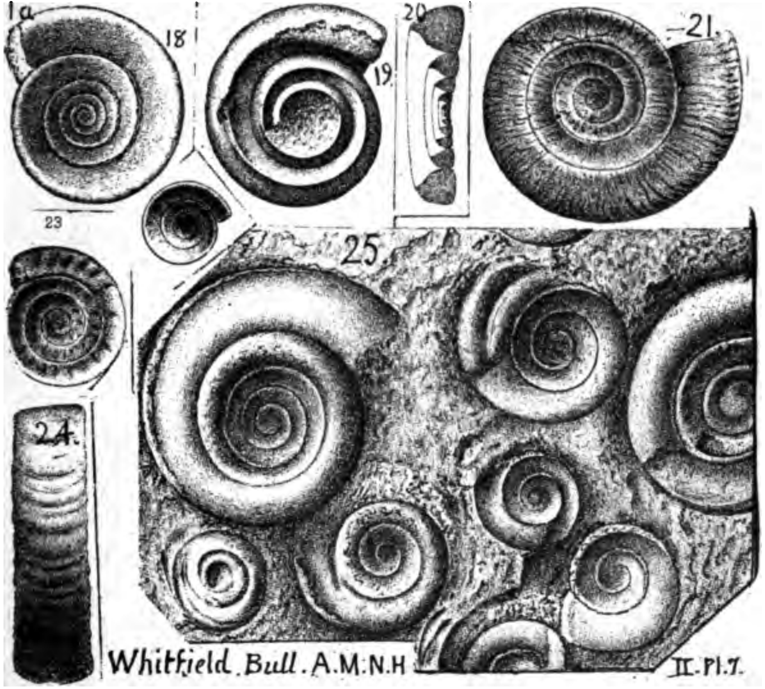
Onychodus sigmoides. Newberry.





Ophileta compacta, Salter. Can. Org. Rem. Decade 1, 1859, *Calciferous.* Geol. Can. 1863, p. 102, fig. 9 *a*, under? or flat side; *b*, cast of upper or concave side. *Potsdam sandstone*, *I.* — Page 115, fig. 23 *a*, flat under side; *b*, concave upper side. *Calciferous sandstone*, *II a.* NOTE.—Whitfield makes this a syn. of *O. complanata*; which see below.

Ophileta complanata, Vanuxem. Geol. N. Y. 1842, p. 36, fig. 2, 2.—Emmons, Geol. N. Y. 1842, p. 179, fig. 53, 2.—Rogers, Geol. Pa. 1858, p. 817—Whitfield, Bull. Am. Mus. Nat. Hist. N. Y. No. 2, 1889, p. 48, pl. 7, figs. 18, 19, 20, lower and upper surfaces of a specimen of medium size, and an ideal section of the same; 21, lower surface of



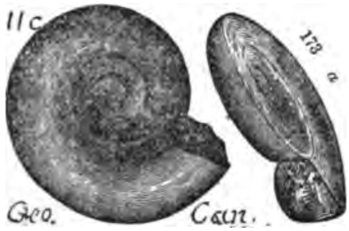
a specimen retaining the shell; 22, upper side of a small individual showing the depressed spire, *O. lævata*. Vanux.; 23, lower side of a smaller shell retaining the surface; 24, *enlarged* view of the back of specimen fig. 23; 25, surface of a slab showing the specimens as they occur on the rock for many square feet togther.—*Calciferous sandstone*, *II a*,

II. 1

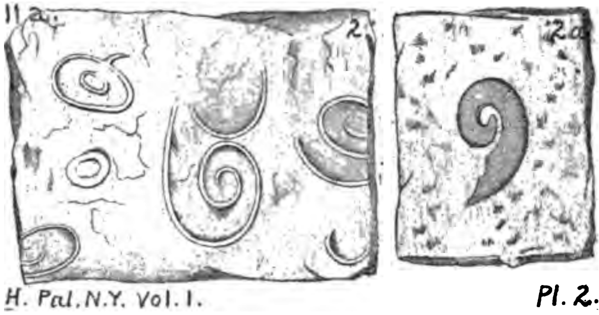
Van. 2

Ophileta levata. Vanuxem, Geol. 3d Dist. N. Y. 1842, p. 36, fig. 2, 1. Emmons, Geol. 2d Dist. 1842, p. 179, fig. 53, 1. *Calciferous sandstone*, *II a*. C. E. Hall, Pioc. Am. Phil. Soc. Phila., Jan. 5, 1876, *Black river* division of the *Trenton group*, *II c*. NOTE. Whitfield makes this a synonym of *O. complanata; which see above.* He also makes *O. nerine*, Bill. (Pal. Foss. I, 245, f. 232) the same; and also *O. compacta*, Salter (Can. Org. Rem. Dec. 1, p. 16, pl. 3).

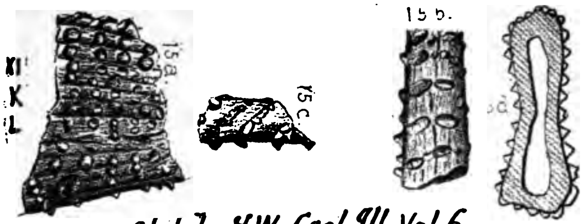
Ophileta ottawaensis, Billings. Can. Nat. and Geol. Vol. 5, 1860. *Trenton.* Geol. Can. 1863, p. 180, figs. 173 *a*, side view; *b*, view of umbilicus. *Trenton limestone*, *II c*.



Ophileta sordida. (*Maclurea sordida*, Hall, Pal. N. Y. Vol. 1, 1847, Calcif. SS. pl. 2, figs. 2, 2 *a*.) — *Straparollus sordidus*, Emmons, Amer. Geol. I, ii, 1855, p. 156, pl. 3, fig. 6. Spire scarcely raised; about three whorls; smooth surface; usually an inch across; projecting from surfaces of *Calciferous* sandstone formation, at Chazy, N. Y.; at Bald Mtn.; Hoosic Falls; and in Wythe county, Va. Emmons. *II c*.

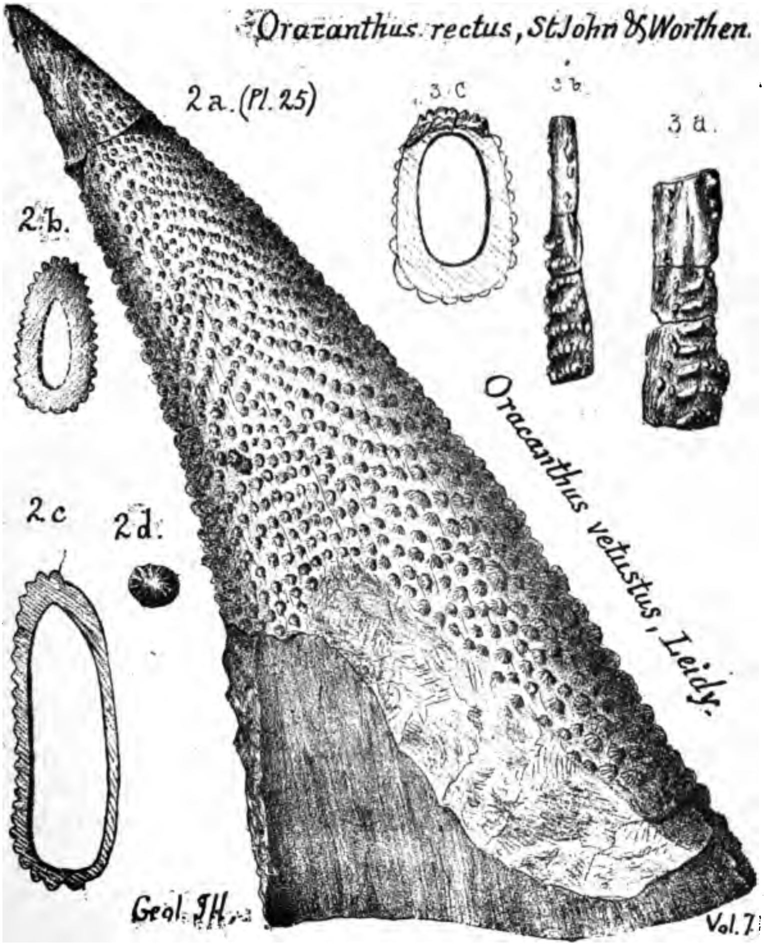

IIa
2
2a
H. Pal. N.Y. Vol. I.
Pl. 2.

Oracanthus ? obliquus. St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, p. 477, pl. 22, figs. 16 *a* to *d*; unique specimen. *Upper Keokuk. XI.*



St. John & W. Geol. Ill. Vol. 6.

Oracanthus rectus. St. John & Worthen, Geo. Sur Ill.,


Oracanthus rectus, St John & Worthen.
2 a. (Pl. 25)
3 c
3 b
3 a
2 b.
2 c
2 d.
Oracanthus vetustus, Leidy.
Geol. Ill.
Vol. 7

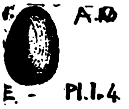
Vol. 7, 1883, p. 257, pl. 25, figs. 3 *a*, fragment of fish-spine, showing back (?) border; 3 *b*, seen from the right (?) side; 3 *c*, *restored* cross section. *Chester* (*sub-carb.*) *limestone.*—*XI.*

Oracanthus vetustus, Leidy. (Figures included with those of *O. rectus* above.) Jour. Acad. Nat. Sci. Phila., 2d Ser. Vol. 3, 1854. St. J. & W., Geo. Sur. Ill., Vol. 7, 1883, p. 255, pl. 24, figs. 2 *a*, right side of the fish-spine; 2 *b*, *c*, cross sections of it showing thickness of walls of pulp-cavity; 2 *d*, *enlarged* tubercle. *St. Louis limestone*, Mo.—*XI.*

Orbicula corrugata. See **Crania corrugata.** *V b.*

Orbicula crassa. See **Obolella crassa.** *M. C.*

Orbicula excentrica, found by Emmons in the white, friable shales of Virginia, L. Sil. or Cambrian, with *Lingula striata*, etc., Am. Geol. Vol. 1, pt. 2, p. 112, pl. 1, fig. 4.—*I*, or *C.*



Orbicula filosa. See **Schizocrania filosa.** *III a*, *III b.*

Orbicula grandis. See **Discina grandis.** *VIII c.*

Orbicula lamellosa. See **Discina circe.** *II c.*

Orbicula lodensis. See **Discina lodensis.** *VIII e.*

Orbicula (*lodensis ?*) Rogers, p. 829, found with *Goniatites interruptus*, in Penna. See note, but no figure. *VIII e.*

Orbicula minuta. See **Discina minuta.** *VIII b.*

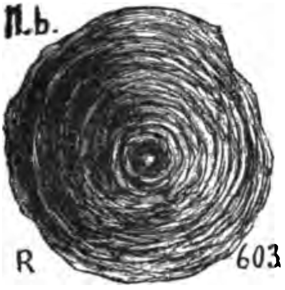
Orbicula nitida. See **Discina nitida.** *XIII.*

Orbicula parmulata. Hall, p. 48, fig. 6, 4. *Medina* formation. *IV.*

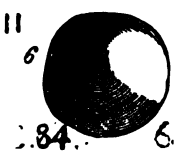
Orbicula squamæformis. See **Pholidops squamiformis.**

Orbicula terminalis. See **Trematis terminalis.** *II c.*

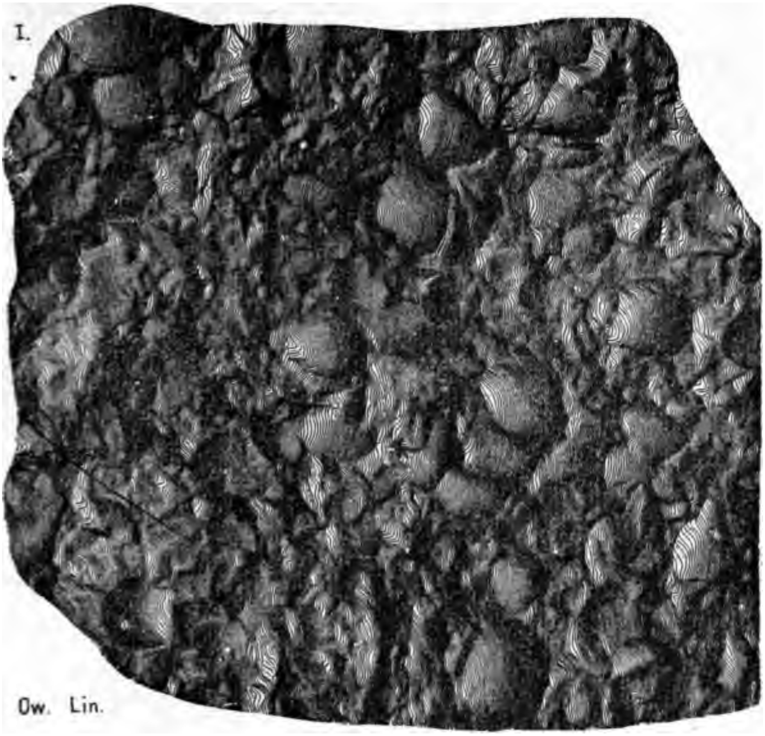
Orbicula ———. Rogers, Geol. Pennsylvania, 1858. p. 818, fig. 603. *Trenton* formation. *II c.*



Orbicula ———. Emmons, Geol. Second District N. Y., 1843, p. 312, fig. 54, 6. *Trenton limestone.* *II c.*



Orbiculas and Lingulas, of several different species, living together, are shown in Owen's medal-ruled fig. of a slab from the Falls of St. Croix, Iowa. *St. Croix sandstone* (not the *Potsdam* of N. Y.) supposed at one time to be quite barren of fossils; now a treasury of species differing from those of the Potsdam. *II a.*

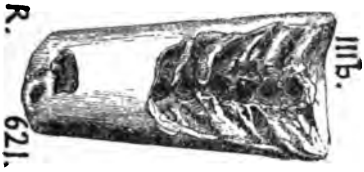


Orbicula ——— ? Mentioned by H. D. Rogers in Geol. Penn. 1858, as found in *Utica* and *Hudson river formations. III a, b.*

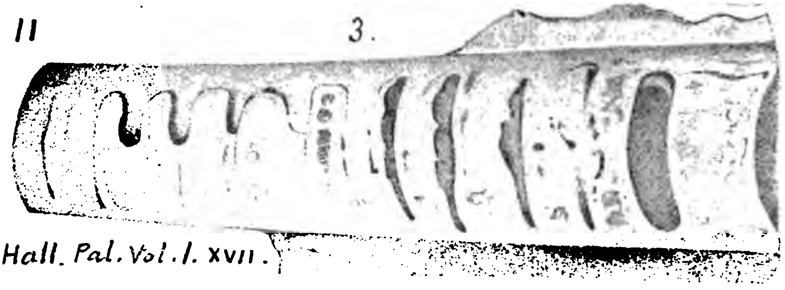
Orbicula ——— ? In C. E. Hall's collections at Bell's Mills, Blair Co., Pa., 1875, Proc. Am. Phil. Soc. Jan. 5, 1876. *Clinton formation, V a.*

Orictoblattina occidna. Scudder. An insect found in Mazon cr. nodule, Ill. Proc. A. N. S. Phila. 1885, p. 37. In the Lacoe collection. *Coal Measures. XIII.*

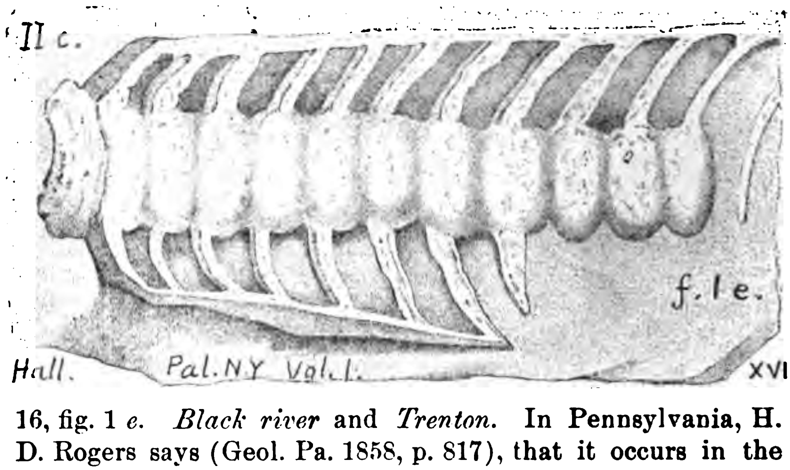
Ormoceras crebriseptum. Rogers, p. 821, fig. 621, *Loraine* (*Hudson river*) *formation.* (See Hall, Pal N. Y. Vol. 1, 1847.)



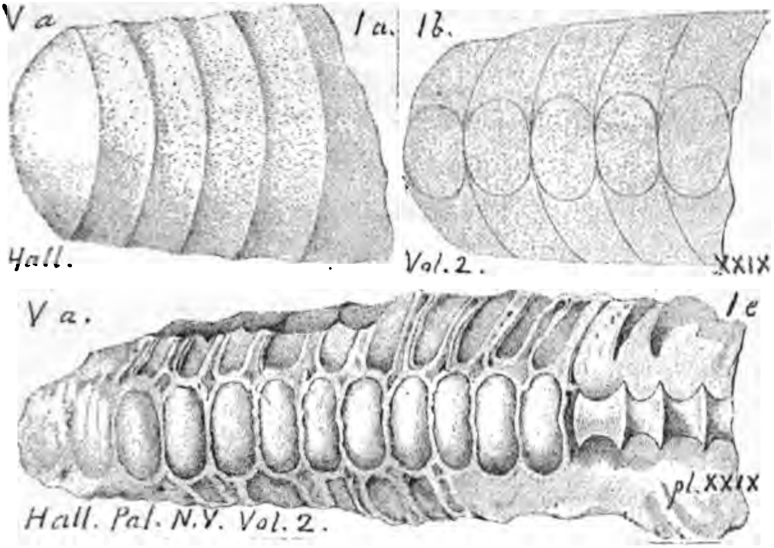
Ormoceras ? gracile. Hall, Pal. N. Y. Vol. 1, 1849, pl. 18, fig. 3. *Black river formation.* *II c.*


II
3.
Hall. Pal. Vol. I. XVII.

Ormoceras tenuifilum. Hall, Pal. N. Y. Vol. 1, 1849, p. 16, fig. 1 *e.* *Black river* and *Trenton.* In Pennsylvania, H. D. Rogers says (Geol. Pa. 1858, p. 817), that it occurs in the Black river division of the *Trenton* with, but more seldom than, *Orthoceras multicameratum.* *II c.*

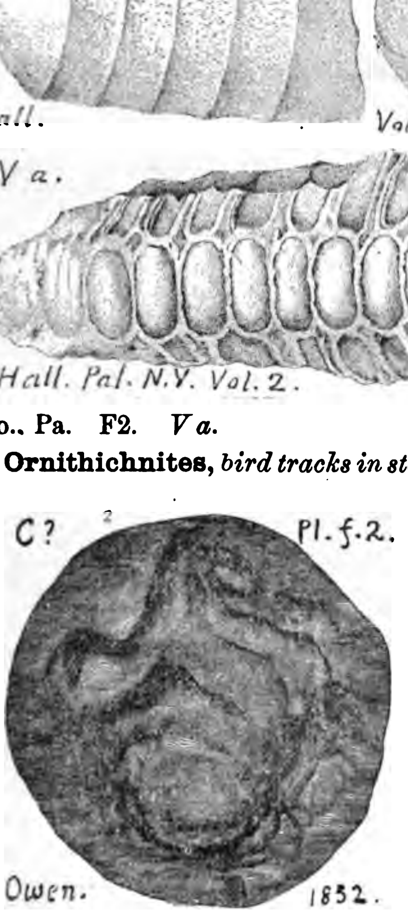

II c.
f. 1 e.
Hall. Pal. N.Y. Vol. I.
XVI

Ormoceras vertebratum. Hall, Pal. N. Y. Vol. 2, 1852, pl. 29. fig. 1 *a*, 1 *b*, and 1 *e.* *Clinton.* Claypole finds it often abundant in the *Ore sandstone*, and *Sand-vein ore bed*, in Perry



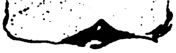
Co., Pa. F2. *V a.*

Ornithichnites, *bird tracks in stone.* Owen's curious figure, medal-ruled, in his Geol. Wisc., Iowa and Minn., 1852, pl. 1, fig. 2, cannot by any possibility be a *bird* track, for it was found on a slab of red sandstone, on the N. W. shore of Lake Superior, where the rocks are of a presilurian age, and we have no trace of the existence of birds until long after the Coal Age. Owen, after studying many and various forms of it, all found in the same rocks, concluded that they were all unknown seaweeds.

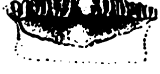


Orodus elegantulus. N. and W., Pal. Ohio, Vol. 2, 1875, p. 51, pl. 58, fig. 12, 12 *a*.

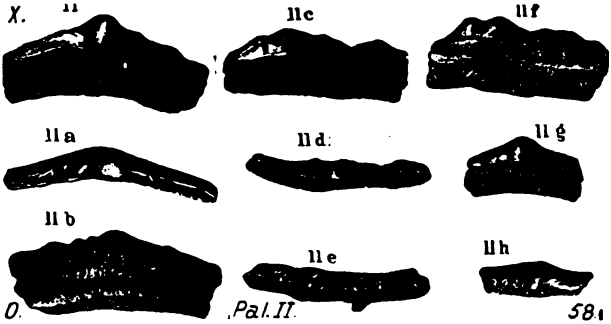
12



12 a.

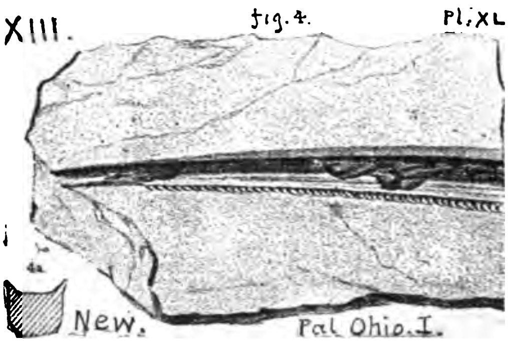


Orodus variabilis. Newberry, Pal. Ohio, Vol. 2, 1875, p. 50, pl. 58, figs. 11, back of large tooth; 11 *a*, *b*, crown and front views; 11 *c*, *d*, *e*, *f*, *g*, *h*, smaller teeth of the same series. At Sciotoville, O., in the black shale of the *Waverly*, *X*.

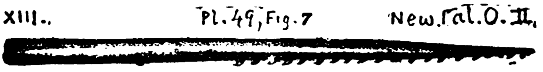


Orodus ——— ? Fish scales common in the *Meadville upper limestone*, at Glendale, Pa. Q4, p. 83, 140.—*X*.

Orthacanthus arcuatus. Newberry, (*Pleuracanthus arcuatus*, New.) Pal. Ohio, I, 1873, p. 332, pl. 40, fig. 4; the spine of a *Pleuracanthoid* fish, attached to the back of the head and supporting a head-fin. See Brongniart's fine reproduction of the recently-discovered **Pleuracanthus gaudreyi.**—Not uncommon in the Linton cannel coal of Ohio, coated with sulphide of iron and looking like metal stilettos of formidable utility; accompanied by *Diplodus teeth* in great abundance, each *Diplodus* having several hundred teeth and only one spine. In several cases the spines were found buried in (apparently) a mass of head cartilage, with a Diplodus jaw set with teeth—thus anticipating Brongniart's discovery. *XIII*.

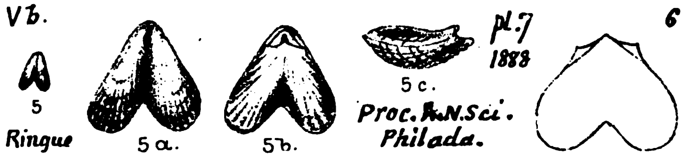


Orthacanthus gracilis. Newberry, Pal. Ohio, Vol. 2, 1875, p. 56, pl. 59, fig. 7. Coal measures, Linton, Ohio.—*XIII*.


XIII..
Pl. 49, Fig. 7
New. Pal. O. II.

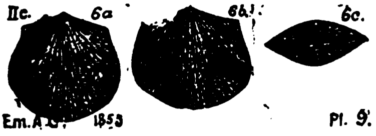
Orthis acuminata, Billings. Can. Nat. Geol. Vol. 4, 1859. Geol. Can. 1863, p. 130, figs. 59 *a*, ventral valve; *b*, side view. *Chazy limestone, II b.*

Orthis acutiloba, Ringueberg. Proc. Acad. Nat. Sci. Phila.

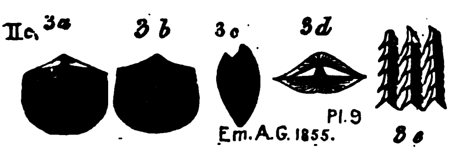


1888, part 2, p. 134, pl. 7, fig. 5, 5 *a*, *b*, *c*, belonging to the group of *O. biloba*, Lin. (See outline of this as fig. 6); and *O. varica*, Con.; but has a deeper sinus, and a hinge line only half as long. Only two perfect ones yet found; but a single valve is sometimes found in the middle and lower divisions of the *Niagara* shale at Lockport, N. Y. (*O. biloba* seems absent here.)— *V b.*

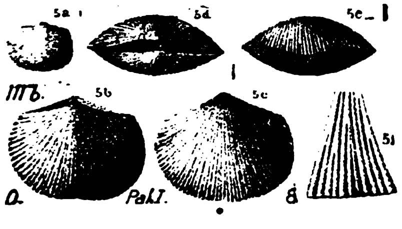
Orthis æquivalvis. Hall. Pal. N. Y. Vol. 1, 1847, Trenton. Emmons, Am. Geol. I, ii, 1855, 196, pl. 9, fig. 6 *a*, *b*, *c*. Shell symmetrical; more than thirty folds, forking once or twice.—Trenton formation, *II c.*



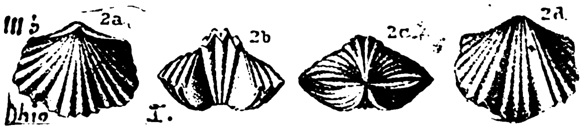
Orthis bellarugosa. Conrad, Proc. Acad. Nat. Sci. Phila. Vol. 1, 1843, Trenton. Emmons, A. G. I. ii, 1855, 197, pl. 9, figs. 3 *a*, *b*, *c*, *d*; small shell; back valve with a narrow groove in the middle; folds numerous, forking unequally and scaly (imbricated).——Trenton formation, *II c.*



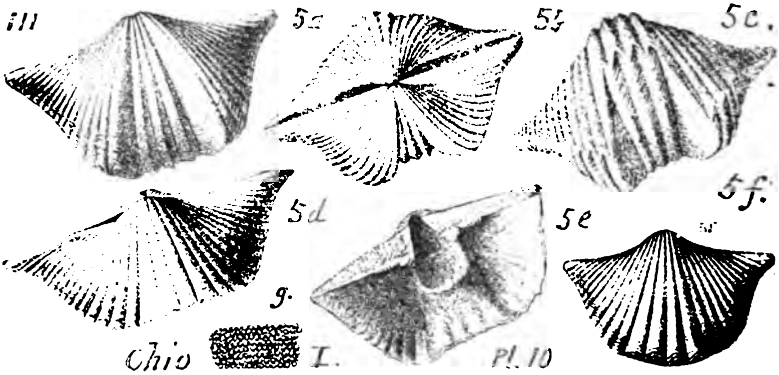
Orthis bellula, James. Pal. Ohio, Vol. 1, 1873, p. 103, pl. 8, figs. 5 *a*, *natural size*, back; 5 *b*, *magnified two diam.* same; 5 *c*, *magnified*, ventral; 5 *d*, ditto, hinge; 5 *e*, ditto, front; 5 *f*, ditto, striæ on the surface. *Cincinnati group. III b.*



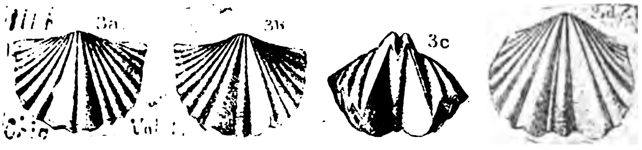
Orthis (*Platystrophia*) **biforata.** (*Terebratula biforata*, Schlot. Pet. 1820.) A variety, or young shell, Pal. Ohio, Vol. 1, p. 117, pl. 10, fig. 2 *a*, dorsal view; 2 *b*, front view, showing the very prominent mesial fold and deep sinus; 2 *c*, back view; 2 *d*, ventral view. *Cincinnati* (*Hudson river*) *formation*, *III b*.



Orthis (*Platystrophia*) **biforata,** Var. **acutilirata.** (*Delthyris acutilirata*, Conrad, Jour. Acad. Nat. Sci. Phila. Vol. 8, 1842, *Cincinnati group.*) Pal. Ohio, Vol. 1, 1873, p. 119, pl. 10, figs. 5 *a*, ventral view of rather large adult; *b*, back view, hinge area, incurved beaks; *c*, front; *d*, back of a more transverse specimen; *e*, ventral interior, deep scars, hinge area, hole (foramen), hinge teeth, but the comb structure near the teeth does not always occur; *f*, back of another specimen; *g*, *magnified* grained surface, common to all the other varieties of *O. biforata*, where well preserved.—*Cincinnati*, *III b*.

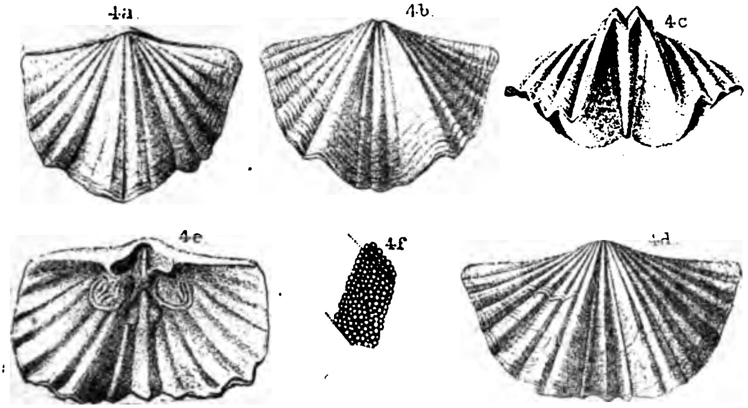


Orthis (*Platystrophia*) **biforata,** Var. **dentata.** (*Porambonites dentatus*, Pander, Beitrag. Geol. Russ. 1830.) Pal. Ohio, Vol. 1, 1873. p. 117, pl. 10, fig. 3 *a*, back view of a specimen with two folds in the mesial fold, and



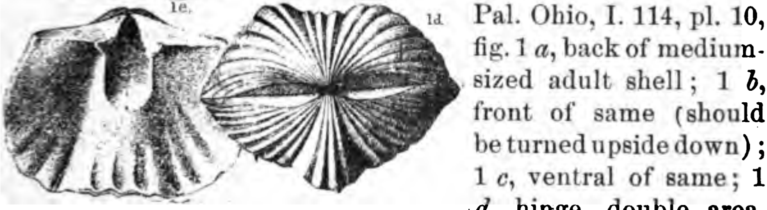
one in the sinus; 3 *b*, ventral view; 3 *c*, front view, showing prominent mesial fold and deep sinus; 3 *d*, ventral view of another specimen with a second smaller plication in sinus, and a third on the fold. *Hudson river* (*Cincin.*) *formation*, *III b.*

Orthis (*Platystrophia*) **biforcata,** Var. **laticosta,** James.

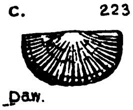


Pal. Ohio, Vol. 1, 1873, p. 116, pl. 10, figs. 4 *a*, back; *b*, belly valve; *c*, front, showing prominent mesial fold in the wide, deep bay (sinus); *d*, inside of belly valve; *e*, inside of back valve, showing the obscure muscular scars, very small linear cardinal process, and the tooth-like brachial processes; *f*, *magnified* granular surface.—*Cincinnati*, *III b.*

Orthis biforata (*Platystrophia*) Var. **lynx,** Von Buch.

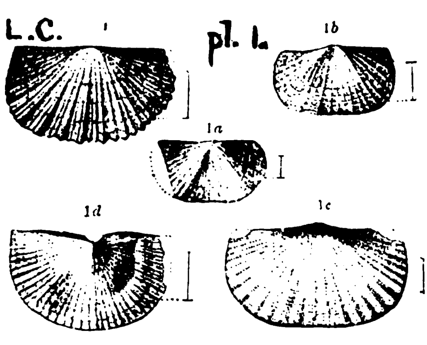


Pal. Ohio, I. 114, pl. 10, fig. 1 *a*, back of medium-sized adult shell; 1 *b*, front of same (should be turned upside down); 1 *c*, ventral of same; 1 *d*, hinge, double area, foramen; 1 *e*, inside of ventral valve, showing area, foramen, teeth, deep muscular scar. *II c* up to *V a*.



Orthis billingsi, Hartt. Dawson's Acad. Geol. 1868, p. 644. fig. 223; foramen triangular and of moderate size; surface ornamented by about thirty prominent rounded rays, widening towards the edge, crossed by some distinct concentric squamose growth-lines and many fine concentric striæ (not shown in the figure). Rather common in the *Trilobite shales*, St. John, N. B.—*Cambrian*, *C*.

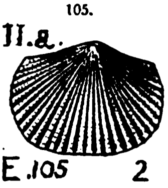
Orthis billingsi, Hartt. (1868, Dawson's Acad. Geol. 2d Ed. p. 644, fig. 223.) Walcott, Bulletin No. 10, U. S. G. S. p. 17, pl. 1, fig. 1, cast of ventral valve, *enlarged twice*; fig. 1 *a*, small ventral valve (doubtfully referred to this species) *enlarged thrice*; fig. 1 *b*, cast of ventral valve, *enlarged twice*; 1 *c*, outside of dorsal? valve, ribs crossed by fine concentric wavy lines, *enlarged thrice*.—Cambrian (St. John) formation, New Brunswick. *C*.



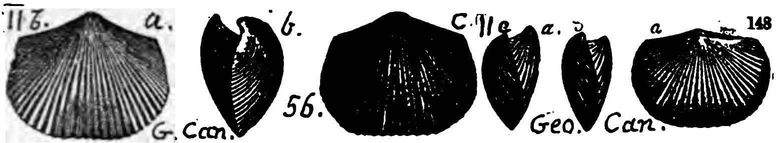
Orthis biloba, Linn. Figure from Collett's Indiana Report of 1881, p. 286, pl. 27, fig. 16, ventral valve, *enlarged twice*.—*Niagara limestone*, *V b*.—See, also, an outline of the European species given by Ringueberg for comparison with his new (1888) species, *O. acutiloba*, under that name above.

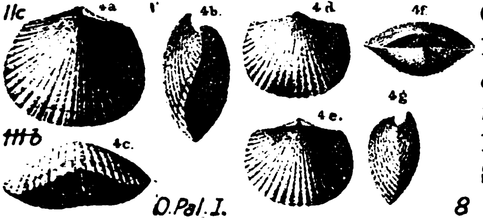
Orthis bisulcata. See **Camarella bisulcata.** *II c*.

Orthis callactis? (*Orthis flabellulum*, Sil. Res. xxi, fig. 8.) Emmons, p. 394, fig. 105, 2. Hall, p. 105, fig. 36, 5. *II c*, Trenton formation. (For figure of Hall see **Orthis flabellulum.**)



Orthis borealis, Billings. Can. Nat. and Geol. Vol. 4, 1859.



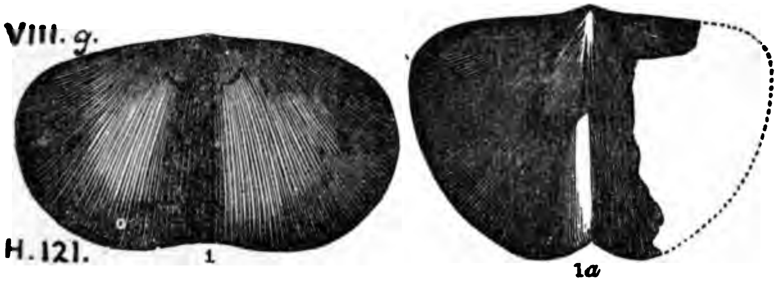


Geol. Canada, 1863, p. 129, fig. 56 *a*, ventral; *c*, dorsal valves. *Chazy formation*, *II b*.—Page 167, fig. 148 *a*, *b*, *c*.—See, also, Pal. Ohio, Vol. 1, 1873, p. 101, pl. 8. fig. 4 *a*, *b*, *c*, back, profile, front views; *d*, *e*, *f*, smaller specimen, belly, back and hinge views.—*Trenton*, *II c*.

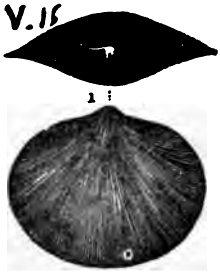
Orthis canalis. See **Orthis elegantula.** *V b.*

Orthis carbonaria. See **O. pecosi.** *XIII.*

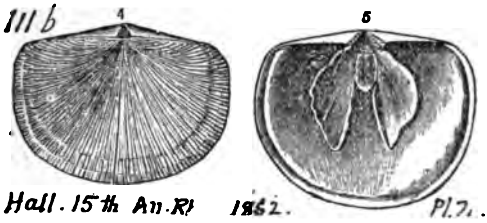
Orthis carinata, Hall. Geol. 4th Dist. N. Y., 1843, p. 267, fig. 121, 1 and 1 *a*.—*Portage and Chemung*, *VIII f*, *g*.—In Perry Co , Pa., Middle Ridge, south slope, on road north from New Bloomfield. Claypolé's spec. 39-9. (OOO, 11,943.)—*Chemung*, *VIII g*.

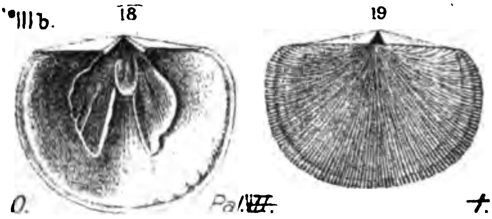

VIII. g.
H. 121.
1
1a

Orthis circulus. Hall, page 71, fig. 16, 1. *Clinton formation.* *V a.* Doubtful specimen 501–42, (OO. p. 233) in Hale & Hall's collections in Mifflin Co., Pa., at McKee's fossil ore mine, from the shale roof of the ore bed, 7 miles from Lewistown. *Clinton*, *V a.*

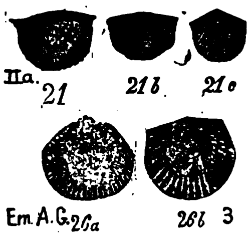


Orthis clytie, Hall, 14th Annual Report, 1861, p. 90; 15th Annual Report, 1862, pl. 2, fig. 4, dorsal view; 5, interior of ventral valve. Also, Pal. Ohio, Vol. 2, 1875, p. 75, pl. 1, figs. 18, 19, *from the original specimens on which the species was founded;* 18, interior of ventral valve; 19, dorsal exterior.—*Cincinnati group.*—*III.*

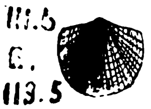




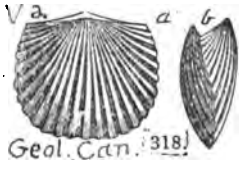
Orthis costalis. (Hall, Pal. N. Y. Vol. 1, 1847, Chazy limestone.) Emmons, Amer. Geol. Vol. 1, part 2, 1855, p. 235, pl. 3, fig. 21 *b*, *c*, 26 *a*, *b*; about 32 strong folds on the two valves, one of which is flatter than the other. In the thin Chazy limestone beds, especially near Chazy village, Clinton Co., N. Y. Emmons, *II b.*—"*O. costatus*," specimen 204-7 (OO, p. 232) in Fellows' coll. mill-dam, Reedsville, Mifflin Co. *Trenton*, *II c.*—C. E. Hall reports it from Kishicoquillis Valley, Proc. A. P. S. Jan. 5, 1876, in *Chazy*, *II b.*



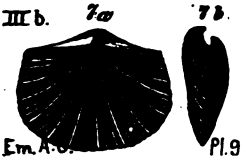
Orthis crispata. Emmons, p. 404, fig. 113, 5. Loraine (Hudson river) formation. *III b.*



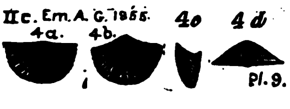
Orthis davidsoni, De Verneuil. Bull. Geol. Soc. France, Vol. 5, 1840, *Upper Silurian.* Geology of Canada, 1863, p. 312, fig. 318 *a*, dorsal; *b*, side views. In Logan's chapter on the *Medina* and *Clinton formations* of Canada West. *V a?*

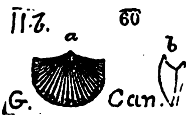


Orthis demissa? Cast showing muscular scar, 854–41, (OO, p. 236) in Sherwood's coll. Charlestown, Tioga Co. Pa. from *Upper Chemung*, *VIII g.*



Orthis dichotoma. (Hall, Pal. N. Y. Vol. 1, 1847.) Emmons, Amer. Geol. Vol. 1, pt. 2, p. 195. fig. 13; valves unequally convex; folds fork half way from beak to base; crenulations indistinct.—*III b.* Blue limestone of Ohio (Hudson river) formation NOTE.—S. A. Miller makes this and **Orthis fissicosta** (Hall) the same.

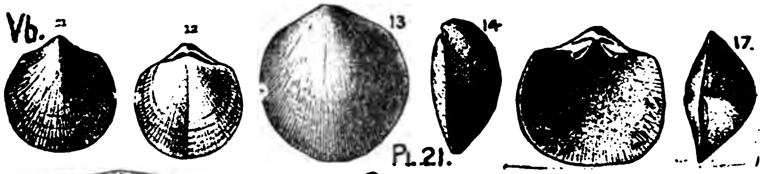


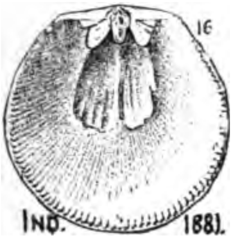


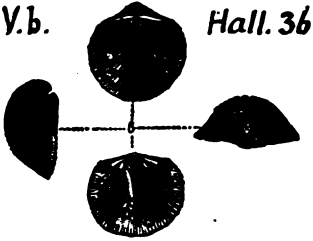
Orthis disparilis. (Conrad, Proc. A. N. S. Phil. 1843.) Em. A. G. I, ii. 1855, 194, pl. 9, fig. 4 *a*, *b*, *c*, a small shell; hole narrow; about 28 folds, half of them beginning under the beak (umbo) crossed by many concentric lines. *Black river and Trenton.*—Geol. Can. 1863, p. 130, fig. 60 *a*, ventral valve; *b*, side view. *Chazy limestone*, *II b*, *c.*

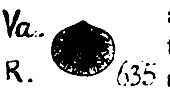
Orthis dubia. (Hall, Trans. Alb. Inst. 1856, Vol. 4. Whitfield, Bull. 3, Am. Mus. N. H. N. Y. 1882, pl. 6, figs. 1 to 5.) Collett's Indiana Rt. 1882, p. 324, pl. 29, fig. 1, back view of fat specimen from Bloomington, Ind.; figs. 2, 3, 4, a larger specimen from Spergen Hill; fig. 5, inside of ventral valve of large specimen from Paynter's Hill. Subcarboniferous. *XI.* NOTE.—Extremely like *Orthis michelina*, but grows only one-tenth as large; perhaps its young? Collett.

Orthis electra. Billings, Pal. Foss. Vol. 1, 1862. Geol. Can. 1863, p. 231, fig. 246 *a*, ventral valve; *b*, side view. *Quebec group* (*Lower Silurian*). *II.*

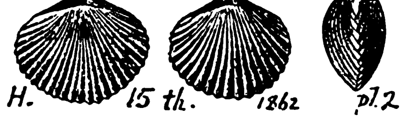




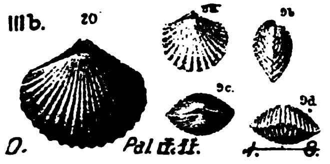




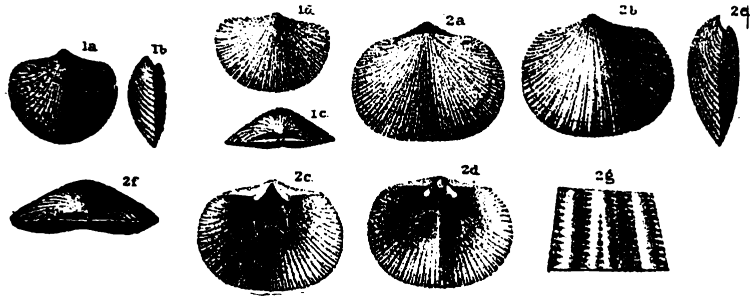
Orthis elegantula, (*elegans*) Dalman. (K. V. AK. Handl. 1827; see Sil. Res. 630, 13, f. 12 *a*.) Figures from Collett's Indiana Rt. 1881, p. 285, pl. 21, figs. 11, 12, ventral and dorsal valves of a small specimen; 13, ventral; 14, lateral; 15, interior of a large specimen, showing the hinge area, teeth and wide hole (foramen); 16, *enlarged twice*, dorsal interior, showing muscular scars, cardinal and crural scars, cardinal and crural processes, and external cardinal (hinge) area; 17, hinge view of 14.—*Orthis canalis*, Hall, Geol. 4th Dist. N. Y., 1843, p. 105, fig. 36, 6.—Rogers, Geol. Pa. 1858, p. 823, fig. 635.—*Niagara limestone*, *V b;* but in Pennsylvania *Clinton shale*, *V a*.—Cat. OO, p. 233, spec. 501-12 (dorsal cast), 501-30 (two); 501-41, 47; 502-1, 502-2 (with *Homalonotus delph.*); 502-12, 23; 502-29 *a* (impressions); 502-42; 505-37 (four) all from Mifflin Co. *Clinton ore bed roof shales.*—In Huntingdon Co. in the 133′ shales (in the limestone layers) over Orbisonia ore bed. T3, p. 141.—In Bedford Co. in the shales parting the ore bed at Wolfsburg. T2, p. 144.—OO, Hall & Hale's spec. 502-23, from the shales over the *ore.*—Geology of Canada, 1863, p. 312, fig. 320. In Logan's chapter on the West Canadian *Medina* and *Clinton formations. V a?*

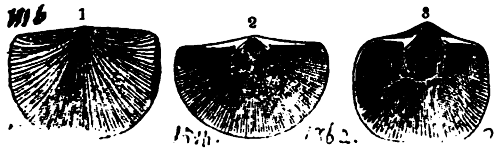


Orthis (?) **ella,** Hall, 13th Annual Report, 1860, p. 121; 15th An. Rt. 1862, pl. 2, fig. 6, 7, 8, showing the extremes of variation in number of plications, etc. "The species is not an *Orthis*, but possesses characters belonging to *Trematospira*, but with a more distinct area than has been observed in any species of that genus; while there is no sinus (groove) upon the ventral valve." Hall. Also, Pal. Ohio, Vol. 2, 1875, p. 76, pl. 1, fig. 9 *a*, *b*, *c*, back, profile, hinge (showing very restricted area); *d*, front views; fig. 20, dorsal view of one of the original specimens on which the species was founded.—*Cincinnati*, *III b.*

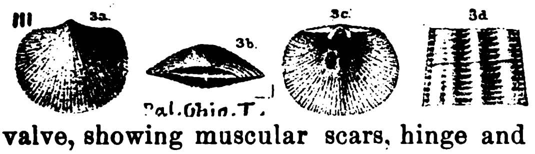


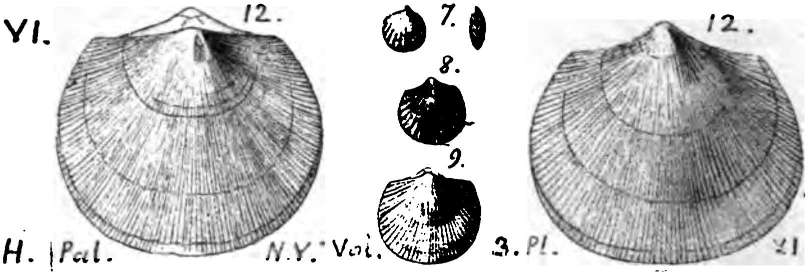
Orthis emacerata, Hall, 13th Rt. 1860, p. 121; 15th An. Rt. 1862, pl. 2, fig. 1, dorsal valve; 2, ventral valve, interior; 3, same of a form ordinarily referred to *Orthis testudinaria*.—*Cincinnati group* (*Hud. Riv.*) *III b.*—Also Pal. Ohio, Vol. 1, 1873, p. 109, pl. 8, fig. 1 *a*, *b*, *c*, dorsal, profile and hind view of medium-sized normal specimen; 1 *c*, ventral view of a typical, more transverse specimen; 2 *a*, *b*, dorsal and ventral larger specimen; 2 *c*, *d*, interiors of ventral and dorsal valves; 2 *e*, profile of 2 *a*; 2 *f*, hinge of same; 2 *g*, *much magnified* surface minute lines of growth crossing furrows between striæ.





Orthis emacerata, Var. **multisecta**, James, Pal. Ohio, p. 112, pl. 8, fig. 3 *a*, *b*, ventral and hinge views; 3 *c*, interior of dorsal valve, showing muscular scars, hinge and brachial processes; 4 *d*, magnified surface striæ, showing them crossed by another excessively fine series, in furrows. *Cincinnati group*, *III b.*

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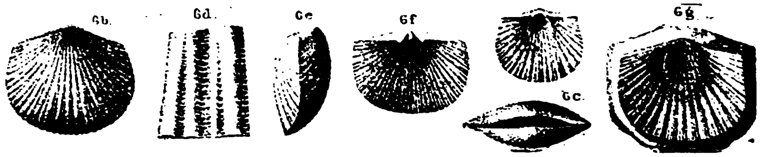
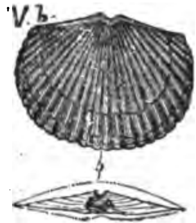
H. Pal. N.Y. Vol. 3. Pl. VI

Orthis eminens, Hall, Pal. N. Y. Vol. 3, 1859, pl. XI, figs. 7, 8, 9, 12, 12. *Lower Helderberg.*—In Pennsylvania collections (OO, p. 234) specimens 604–7 (three) in F. & G.'s coll. at Mansing's quarry, near Hazardville, Carbon Co., Pa., from *Low. Helderberg*, *VI.*—Also (OOO, p. 166), spec. 187–4 (three) from Perry Co., three miles east of Ikesburg; and spec. 216–3 (five) from other outcrops of the *Lower Helderberg chert beds*, *VI.*



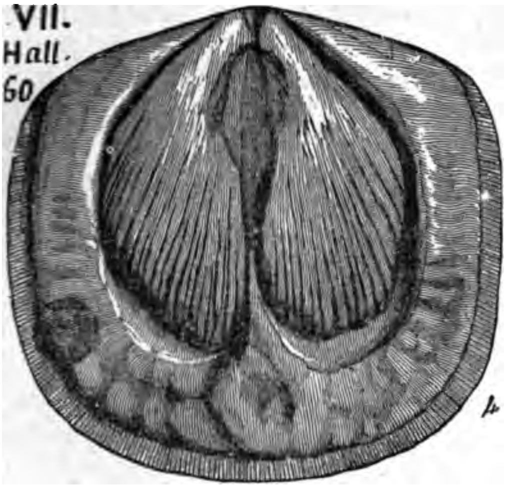
Orthis fissicosta, Hall. Pal. N. Y. Vol. 1, 1847. Emmons, Amer. Geol. Vol. 1, part 2, p. 195, pl. 9, figs. 7 *a*, *b*; valves unequally convex; about 20 ribs angular and divided twice or thrice near the middle.—Same as **Orthis dichotoma** (S. A. Miller). Pal. Ohio, Vol. 1, p. 106, pl. 8, fig. 6 *a*, *b*, *c*, ventral, dorsal, cardinal views; 6 *d*, *magnified* surface striæ crossed by minute lines of growth; 6 *e*, profile of 6 *a*; 6 *f*, inside of a smaller dorsal valve, without visible muscular scars; 6 *g*, inside of ventral valve, hinge margin broken, showing obscure muscular cavity; 6 *h*, inside ventral, small hinge teeth, no cavity.—*Hudson river formation*, *III b.*

Orthis flabellulum, (*O. callactis?*) Hall, p. 105, fig. 36, 5. *Niagara* formation. (*O. flabellum*, name preoccupied by Sowerby, 1839.) Found in specimen 506–8, of C. E. Hall's collections, 1875, at Bell's Mills, Blair Co., Pa., from *Clinton lime shale*, *V a.*

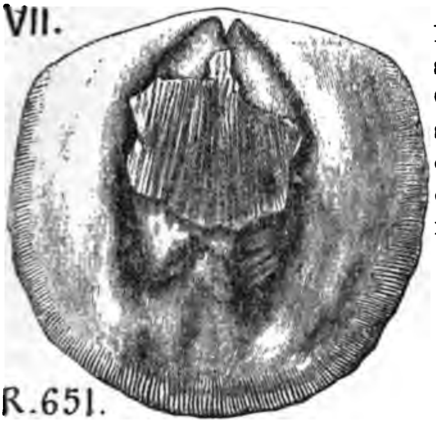


Orthis hipparionyx. (*Atrypa unguiformis*, Conrad; *Hipparionyx proximus*, Van.) Hall, p. 149, fig. 60, 4. Vanuxem, p. 124, fig. 4. Rogers, p. 826, fig. 651. *Oriskany formation*, *VII.* OO, p. 235, specimens 701-2 (six), 701-8 (three), 703-1 (five), 703-4, 703-9, in collections from Huntingdon Co., in the Three Springs railway cut; at the ends of Royer's and Sandy ridges, (T, 35; T3, 119) all from *Oriskany* sandstone. See, also, Cat. OOO, p. 130, Claypole's spec. 11,833 from various outcrops in Perry Co. Also on Broadhead's creek, Monroe Co. (G6, p. 124.) — *VII.*

VII. Hall. 60



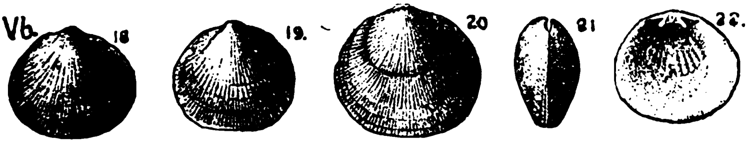
VII.

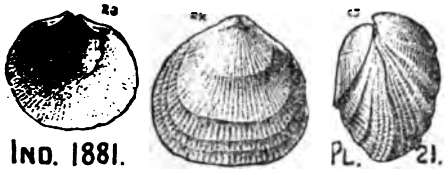


R.651.

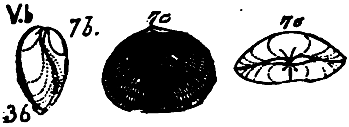
Orthis hybrida, Sowerby. Figures from Collett's Indiana Rt. 1881, p. 284, pl. 21, fig. 18, dorsal view of specimen of usual form and size; 19, ventral; 20, dorsal, unusually large specimen; 21, side

Vb.



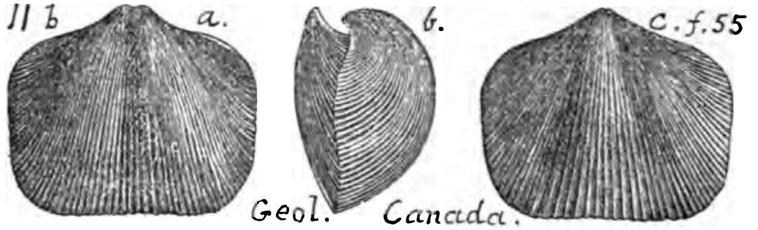


IND. 1881. PL. 21.



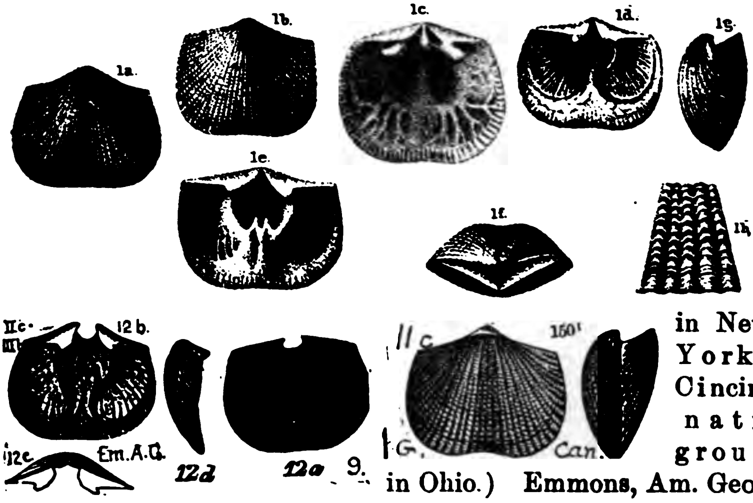
of 18, 19; 22, dorsal interior; 23, ventral interior, scars, teeth, slightly distorted and imperfect; 24, 25, dorsal and lateral of small round specimen, strong growth lines, *twice natural size.*—Hall, Geol. 4th Dist. 1843, p. 105, f. 36, 7 *a*, 7 *b*, 7 *c*. (See Murch. Sil. Res. 13, f. 11.) In *Niagara limestone*, *V b*. OOO, p. 233, specimens 506–10, –14, –16, –17, –19, in C. E. Hall's coll. 2 m. S. W of Bell's Mills, Blair Co., Pa., from *Clinton shale*, *V a*.

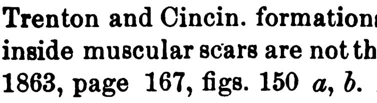
Orthis imperator, Billings. Can. Nat. & Geol. Vol. 4, 1859. Geology of Canada, 1863, p. 129, fig. 55 *a*, dorsal valve; *b*, side; *c*, ventral valve. *Chazy formation*, *II b*.

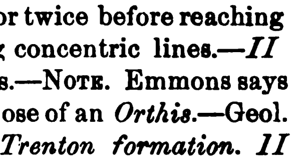


Orthis impressa, Hall, Geol. Fourth Dist. 1843, p. 267, f. 121.2, *Chemung formation.*—*Error on p. 54 above.* Two figgures of this species from Vanuxem, Geol. Third Dist. 1842, f. 49, have been placed by mistake on page 54 of this Dictionary to represent his *Atrypa chemungensis.*—Also, on page 55 above, Sherwood's specimen 854–15 from Tioga Co., Pa. is wrongly named *Atrypa impressa;* it should be *Orthis impressa.* (R. P. Whitfield, MS. correction, 1889.) See OOO, p. 145, spec. 12195, Bradford Co. west of Leroy.—It occurs in Carll's collections, 1875, in N. W. Pa. *Upper Chemung beds.* C. E. Hall, MS. Rt. Dec. 30, 1876.—In Columbia Co. in *Upper Chemung* bed 30 of Sect. 13

at Rupert (G7, 69); abundant 50′ to 100′ above Stony Creek group (G7, 73); in bed 59 of Sect. 78, Catawissa (G7, 268); in bed 28 of Sect. 96, on Fiedler's Creek (G7, 367.) See Cat. OOO, spec. 12182; and 12271 near Bloomsburg—In Huntingdon Co. in *Chemung* beds 300′ beneath the upper (Lackawaxen) conglomerate at Haun's bridge (T3, 98.) Also spec. 238–2 (12852) from mouth of Raystown branch of the Juniata river. —In Perry Co. (OOO p. 134) 27–7, opposite Newport; 34–1, 2½ miles S. of Millerstown; 39–8, Middle Ridge, N. of New Bloomfield; 53–13, south of N. B; 57–35, 36, Junkin farm, S. of N. B.; 64–4, 5; Shermandale; 73–1, Comp's mill, S. E. of N. B.; 141–1 one mile east of Pinegrove.—OO Cat. p. 237. Sherwood's Coll. in Charleston, Tioga Co., Pa. Spec. 853–2, 854–23 (cast, muscular scars, hinge line not quite so straight as Hall's figure); 854–25 (cast and scars); 854–40, 41–43 (three casts, with scars); 854–45 (cast, scars).—Coll. in Sullivan, Tioga Co., Pa. Spec. 855–7 (cast, scars);–19, -22, -46, -57.—Coll. near Mixtown, Clymer, Tioga. Spec. 856–24 (dorsal valve does not resemble *O. impressa*), -24, 25 (ventral valve); -28 (dorsal valve); -33 (ventral, flat).—Coll. 1 m. N. of Mansfield, Tioga Co., Pa. 858, -3 and -8 (dorsal); -9 (ventral); -9 (three dorsal valves); -11 (dorsal, cast); -13 (dorsal valve, the shell partially preserved); -18 (dorsal).—Coll. from Mansfield, Spec. 860–1 *a* (two dorsal valves) -2 *c*; -3 (dorsal); -4 (two casts ventral); -5 *a* (dorsal); -14 (ventral, interior cast); -22 (ventral valve); -28 *a* (two dorsal valves); -30 (ventral, cast); -32 (ditto); -43 (dorsal); 44 (cast ventral); -48 (dorsal); 55 *b* (dorsal and ventral); -60 *a*; -61 *a*; -67 (cast, three ventral); -70 (cast, ventral); -71 (dorsal); -72 (dorsal); -75 (three ventral casts); -79 (cast, ventral) -83 (ventral).—Coll. in Sullivan t., Tioga, Pa. Spec. 861–13 (dorsal); -15 (cast, interior. ventral); -18 (ditto); -22 (dorsal); -27 (two dorsal valves.)—*Note. All the foregoing are from Sherwood's Chemung Upper (White's Chemung-Catskill) beds. VIII-IX.*—Coll. from Perry Co., Pa. Pole Cat valley, bottom bench of *Hamilton fossil ore bed* (top of *Ham. SS.*) Spec. 865–1 (ventral valve.) *VIII c.*—867–3 (dorsal) from near Newport, Perry Co. (OO, p. 237) fossiliferous limestone in the *Chemung*, *VIII g.*—Note, a large number of the above were determined by Prof. Jas. Hall, verifying M. Simpson's determinations, Nov., 1888.—869–7, -8 (small dorsal and ventral valves), from Le-Boeuf quarry, Erie Co. Pa. on outcrop of *Panama conglomerate*, *VIII g*.—872–14, -20 (cast, ventral valve), -21 (four casts of interior of ventral valve and impression of exterior), -48*b* (two casts), all in Coll. from Nichols, Tioga Co., N. Y.—882–6, from Kinzua Creek, McKean Co.—883–32, -61 *b* (cast of ventral valve), -80 *c* (cast), -82 *b*, -87 (cast of ventral valve), -93, all in Coll. in Tioga Co., N. Y.—all the above from *Chemung formation*, *VIII g*.





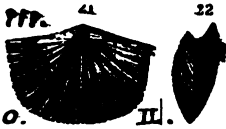


Orthis insculpta, Hall, Pal. N. Y. Vol. 1, 1847. Trenton in New York, Cincinnati group in Ohio.) Emmons, Am. Geol. I, ii, 195, pl. 9, fig. 12, *a*, *b*, *c*, *d*; fine radiating striæ, forking once near the beak, and again once or twice before reaching the edge of the shell; crossed by strong concentric lines.—*II c*, *III b*, Trenton and Cincin. formations.—NOTE. Emmons says that the inside muscular scars are not those of an *Orthis*.—Geol. Canada, 1863, page 167, figs. 150 *a*, *b*. *Trenton formation*. *II c*.—Pal. Ohio, Vol. 1, 1873, page 99, plate 9, fig. 1 *a*, *b*, dorsal, ventral valves; 1 *c*, *d*, dorsal and ventral interiors; 1 *e*, another ventral interior; 1 *f*, *g*, hinge and profile views; 1 *h*, *magnified* surface.—*Cincinnati group*, *III*.

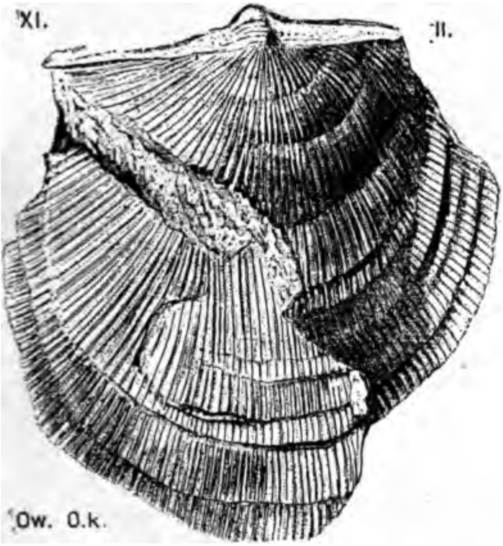
Orthis interlineata. See **Orthis tioga**. *VIII g*.

Orthis interstrialis. (*Strophomena interstrialis*.) See **Strophodonta cayuta**. *VIII g*.

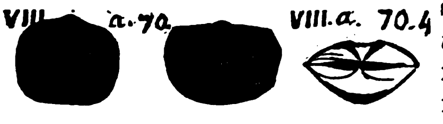
Orthis jamesi, Hall, 14th Reg. Report, 1861.—Pal. Ohio, Vol. 2, 1875, plate 1, fig. 21, 22, dorsal view and profile of the largest of the type specimens of this species.



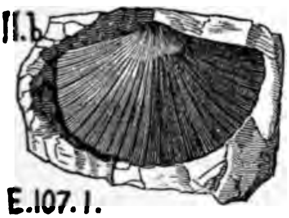
Orthis keokuk. Hall, Geol. Rt. of Iowa, 1858. (*Streptorhynchus umbraculum?* Von Buch; *Orthis umbraculum?* De Koninck; Owen, Geol. Wisconsin, Iowa and Minnesota, 1852, plate 5, fig. 11, on Missouri river, Key creek, and Council Bluffs; differs from the Belgian species in many more ribs or striæ, 60 at the beak and 120 + at the margin; with 3 strong and one weaker circles of growth.)—*Subcarboniferous. XI.*



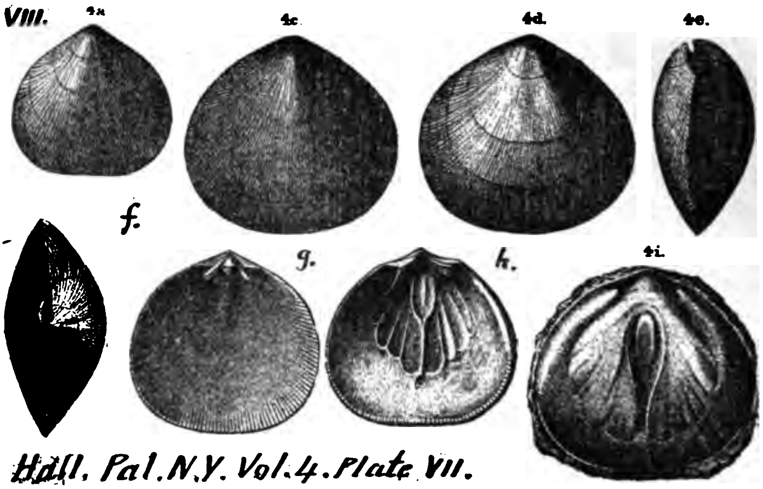
Orthis lenticularis. Vanuxem, page 139, fig. 33, 4; the same given to *Orthis lentiformis*, Hall, page 175, fig. 70, 4.—In the Corniferous (Upper Helderberg) limestone formation; but more abundant in middle than in Western New York. *VIII a.*



Orthis leptænoides. Emmons, Geology of the Second District of the State of New York, 1843, page 396, fig. 107, 1. *Trenton formation, II c.*



Orthis leucosia, Hall. 13th An. Rt. 1860; Pal. N. Y. Vol. 4, 1867, page 48, plate 7, fig. 4 *a*, ventral valve of small specimen; 4 *c*, dorsal, *d*, ventral, *c*, profile, *d*, hinge, of large specimen; 4 *g*, *h*, interiors of dorsal and ventral valves; 4 *i*, cast of a ventral valve. Allied to *O. vanuxemi*. *Hamilton*.—In Pennsylvania collections are specimens 809–8, –9, –11 ? from Dingman's Falls, Pike Co., from *Hamilton rocks*.—877–1, McKean Co. from *Chemung*.—9520, and 9525 (of various sizes) in Randall's collections at Warren, Pa. (wrongly labelled *Orthis michelini*) from *Upper Chemung* or *Chemung Catskill*, *VIII c* to *VIII–IX*.

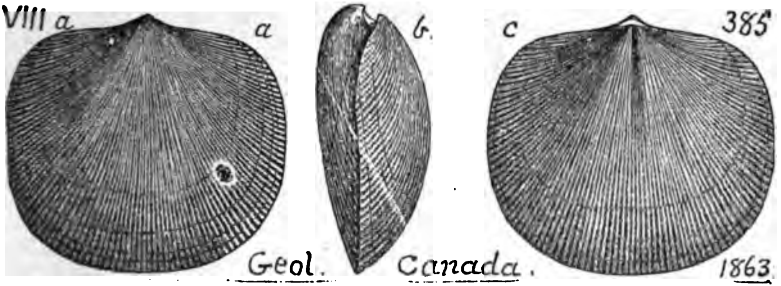


Hall. Pal. N.Y. Vol. 4. Plate VII.

Orthis leucosia, Var. **pennsylvanica**, new variety, S. B. Simpson. See **O. pennsylvanica**. This is founded on specimens 555–45, –47, from Sullivan township, and 856–28, Clymer township, Tioga Co., Pa., all from *Chemung*, *VIII g*.—865–1, Dewees' collections in Mahanoy Valley, Perry Co., from bottom bench of *Upper Hamilton fossil ore bed*, *VIII c*.—878–1 (three examples), Hick's Coll. in McKean Co. *Chemung*, *VIII g*.—882–2 (three) ditto.—9524, 9542, Randall's Coll. at Warren, Pa. *Upper Chemung*, *VIII–IX*.

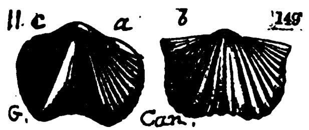
Orthis limitaris. See **Leiorhynchus limitaris**. Add to what is stated on page 306 above, that it has been recognized in Huntingdon, Blair and Centre counties, Pa. in *Marcellus black shale*. T, p. 33; T 4, p. 432.—*VIII b*.

Orthis livia, Billings. Can. Jour. of Sci. and Art, 1860.



Geology of Canada, 1863, page 369, figures 385 *a*, ventral: *b*, side; *c*, dorsal views. *Corniferous limestone*, *VIII a*.

Orthis lynx, (*Delthysis lynx ; Platystrophia lynx ;* and *Terebratula lynx*).

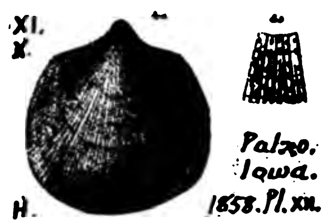


Eichwald Nat. Skit. Podol. 1830.—Geology of Canada, 1863, page 167, figs. 149 *a*, specimen with cardinal angles rounded; *b*, the more common form. *Trenton formation*, *II c*.—In Pal. Ohio, Vol. 1, 1873, page 114, pl. 10, fig. 1 *a–e*, it reads *Orthis* (*Platystrophia*) *biforcata var. lynx*. Von Buch. *Trenton* and *Clinton*, *II c*, *V a*.—Rogers' Geol. Penn. 1858, page 820, fig. 616. *Loraine* (*Hudson river*) *formation*, *III b*. Also Rogers, page 822, no figure, *Clinton*, *V a !*—C. E. Hall reports that it probably occurs among the forms in Nearhoff's quarry near Tyrone forges, Huntingdon county. T, p. 59 , T 4, p. 424. *Trenton*. *II c*.

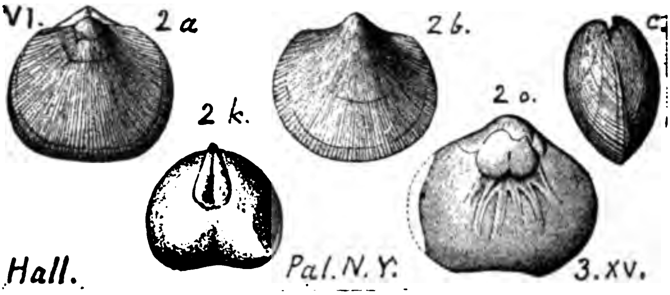
Orthis macloedi, Whitfield. Bull. Amer. Museum Nat. Hist. N. Y. II, 2, 1889, page 43, plate 7, figs. 1, 2, 3, dorsal ? and two ventral valves; 4, *enlargement* of striæ, which are strongly radiating, and distinctly alternating, the increase being chiefly by implantation. Somewhat like *O. evadne*, Bill. (Pal. Foss. I, f. 74) but has a shorter hinge line, and more striæ. Found in upper layers of the *Ophileta bed* at Beckmantown, N. Y. in *Calciferous sandstone formation*. *II a*.

IIa. 1
4
Whitfield. Bul. A. M. II 2. Pl. 7

Orthis michelina; *var.* **burlingtonensis**, Hall, 1858, Geol. Iowa, 1858, page 596, plate 12, fig. 4 a. b, very near **O. dubia**. *XI.* A shell, numerous in Randall's subdivisions F, G, H, of his section at Warren, Pa., has been identified as the *Waverly O. michelini*, by western geologists. (IIII, p. 305.) It seems to be abundant in the *Third mountain sand*, (IIII, p. 273.) Occasionally seen in the *Conglomerite*. (IIII, p. 335.) After examination of Randall's specimens 9520 A, 9522, 9523, 9524, G. B. Simpson described it under the new name **Orthis pennsylvanica.**



Orthis multistriata, Hall, Pal. N. Y. Vol. 3, 1859, plate 15, fig. 2, a, b, c, d, e. *Lower Helderberg.* Recognized by Dr. Barrett among the many forms of the *Lower Helderberg* (I. C. White's *Stormville) limestone* at the Port Jervis bend of the Delaware river. G 6, p. 134.—*VI.*



Orthis musculosa, Hall, Pal. N. Y. Vol. 3, p. 409, pl. 91,

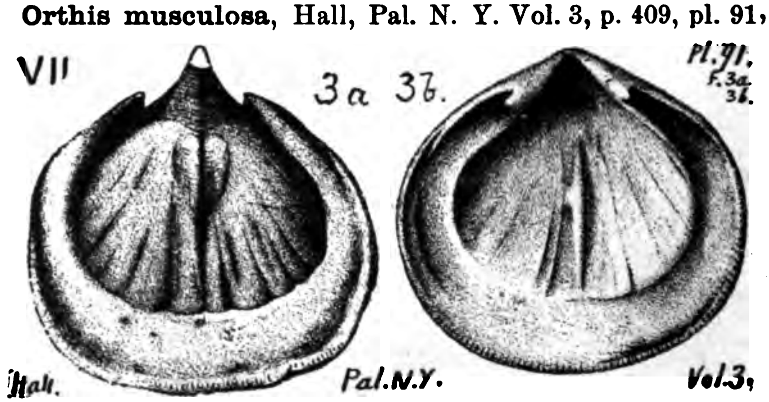
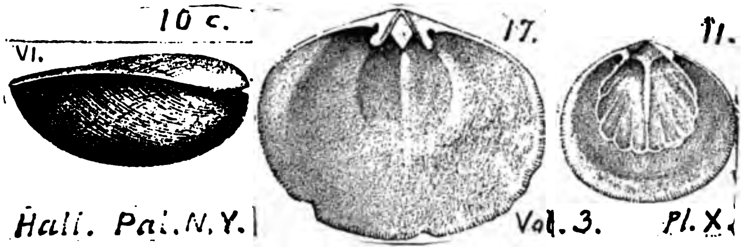


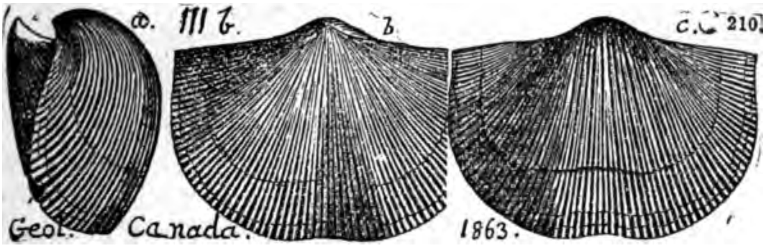
fig. 3 *a*, cast of a large specimen with strongly marked scars; 3 *b*, a mold taken from the cast to show how the inside of the shell looked before it disappeared, but some of the muscular impressions omitted in the drawing. Hall gives other figures, and two of a smaller specimen.—*Oriskany*.—In Pennsylvania doubtfully identified by Ewing among forms in the Alexander quarry between Julian and Unionville in Centre Co. T4, p. 431. Also by Claypole among White's collections from Grove tunnel, Montour Co. G7, pp. 86, 297.—*VII.*

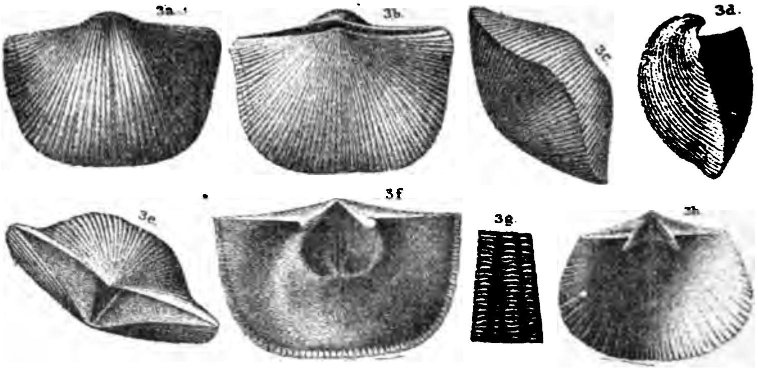
Orthis nucleus. See **Ambocoelia umbonata**. *VIII b.*

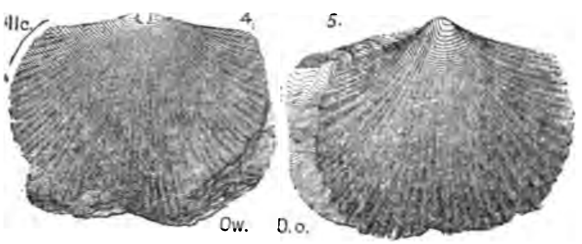
Orthis oblata. Hall, Pal. N. Y. Vol. 3. 1859. pl. x. figs. 10 c, 11, 17. *Low. Held.* (with Var. *emarginatæ.*) Found by J. Hall, as Spec. 608–10 (OO, p. 234) in Coll. along n. slope of Hogback, Pike Co., Pa. from *Lower Helderberg outcrop, VI.*—Also by Dr. Barrett in the *Stormville shales* above and in the *Stormville limestone* below the conglomerate which divides the *Lower Helderberg formation* in Pike Co. (G6, pp. 132, 134).—Also in Aughwick Valley, Huntingdon Co., near Orbisonia, abundant in lower 50′ of *Lower Helderberg limestone* (over the *Waterlime* beds) T, 41; T3, 126. This and *Atrypa reticularis* are the two most common fossils in the *coral beds* (260′ beneath the Oriskany) in White's Weaver run section, Hopewell township. T3, p. 156.—*VI.*


10 c.
VI.
17.
11.
Hall. Pal. N.Y. Vol. 3. Pl. X.

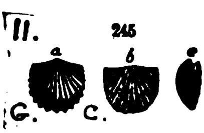
Orthis occidentalis, Hall, Pal. N. Y. Vol. 1, 1847. *Tren*


a. III b.
b.
c.C 210
Geol. Canada. 1863.

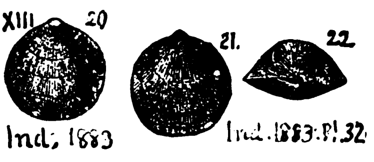




ton to *Hudson river group*. Geology of Canada, 1863, page 210, figures 210 *a*, *b*, *c*, side ventral and dorsal views. *III a*, *b*.—Pal. Ohio, Vol. 1, 1873, page 96, plate 9, figs. 3 *a*, *b*, *c*, *d*, *e*, dorsal, ventral, front, profile, and hinge view (showing high area and foramen) 3 *f*, inside ventral; 3 *g*, *magnified* surface; 3 *h*, inside dorsal.—*Cincinnati group*, *III.* —(*Orthis subjugata?*) Owen's Geol. Wisc., Iowa and Minn., 1852, pl. 2 B, fig. 4, 5, from the shell beds at the base of the upper magnesian limestone of Wisconsin. *II.*

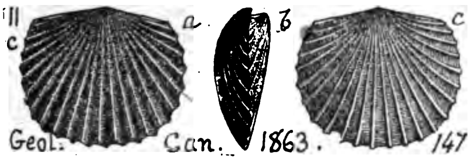


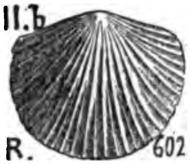
Orthis orthambonites, Pander, as figured by Murchison and de Verneuil, in Russia and the Ural Mtns., 1845. Geology of Canada, 1863, page 231, fig. 245 *a*. *b*, *c*, ventral, dorsal and side views. *Quebec group*. *II?*

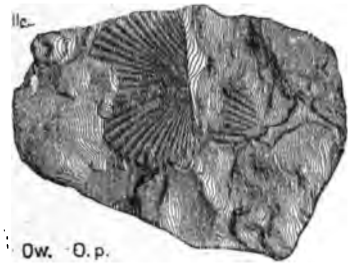


Orthis pecosii, Marcon, Geol. N. America, 1858, p. 48, plate 6, fig. 14. (*Orthis carbonaria*, Swallow, Trans. St. Louis Acad. Sci. Vol. 1, 1858, p. 218.) Collett's Indiana Rt. 1883, page 129, plate 32, figs. 20, 21, 22, *natural size* back, belly and hinge views of common specimen.—Widely distributed in the Coal measures from Indiana to Nebraska and also in the Carboniferous of the Rocky Mts. *XIII.*—In Pennsylvania, in the *Black Fossiliferous* limestone of the Barren measures (250′ beneath the Pittsburgh Coal) in Fayette Co. K 3, 309; L, 35.—*XIV.*

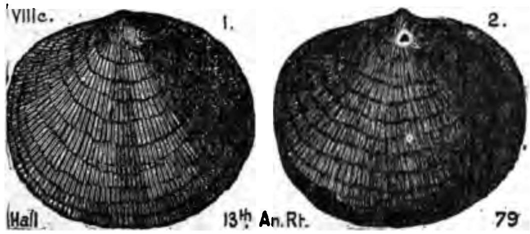
Orthis pectinella, Conrad. Ann. Rt. N. Y. 1840. *Black river* and *Trenton.* Geol. Canada, 1863, page 165, figs. 147 *a*, *b*, *c*.—Rogers, page 818, fig. 602. (Conrad, Ann. Rept. N. Y.—Owen, Wisc., pl. 2 B, fig. 11, Prairie du Chien. *II c.*—OO, p. 231, Specimens in the Cabinet, 206–3 (very poor) from Martin's Creek quarries, Northampton Co., Pa. C. E. Hall found colonies of this shell in the Delaware river quarries at Howell's Cotton Mill, and in the lower beds of the Churchville quarry, which underlie the *encrinal* beds. D3, p. 162. *Trenton, II c.* Ewing reports (doubtfully) an *Orthis pectenalinea* (perhaps *O. pectinella*) from the *Trenton* in Centre Co. T4, p. 424.—*II c.*—210–44 *a* (good specimen of this species, or its variety *ovalis?*), 210–70 (two very good specimens, one quite large), 210–134 (good specimen), 210–140 (one or two very good), all in Fellows' 1876 Collections at Bellefonte, Centre Co., Pa. from *Trenton limestone, II c.*



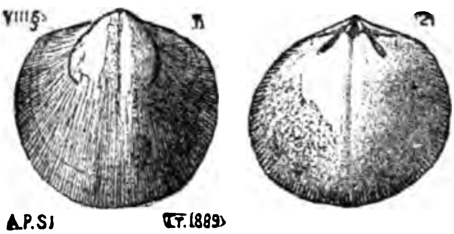




Orthis penelope, Hall. 13th An. Rt. 1860, *Hamilton.*—In Pennsylvania, Huntingdon Co. Oneida township, along Murray's run, in *Middle Hamilton beds*, T3, p. 261.—In Perry Co., Barnett's mill,

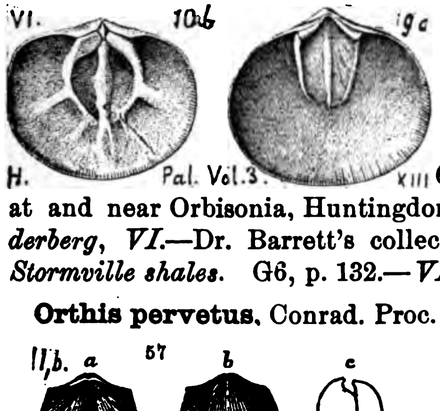


Spec. 11,745 (OOO) *Hamilton upper shale;* Jericho school house, 12,020, *ditto*; Crawley hill, 12,460, *ditto.*—In Columbia Co. Hemlock, Fishing Creek Section, in a richly fossiliferous bed 100′ beneath the top of the *Hamilton.* G7, p. 75, 229.—In the Oil region, Carll's collections, *Upper Chemung* (C. E. Hall, MS. Rt. Dec. 30, 1876.)—*VIII c; (VIII-IX?)*

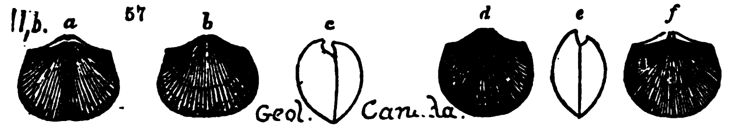


Orthis pennsylvanica, *new species*, Simpson, Trans. Am. Philos. Soc. 1889, Vol. page 437, fig. 1, Shell essentially circular, in nearly all the specimens observed, the height and width being equal; hinge line short, length equal to half the width of the shell; cardinal extremities rounded; lateral and basal margins regularly rounded, except in the middle basal margin of the ventral valve, where there is a slight constriction. Dorsal valve somewhat gibbous, greatest convexity a little above the middle; rapidly curving to the cardinal and lateral margins; a little more gradually to the basal margins. Along the middle of the valve is a flattened or slightly depressed area, narrow at the beak, gradually growing wider, and comparatively broad at the base. Ventral valve. A perfect specimen has not been observed, but gutta-percha casts have been taken from impressions of fragments in the rock which probably belonged to this species. The valve is flattened, or of much less convexity than the dorsal valve, with a slight elevation along the middle, corresponding to the depression of the opposite valve. Surface marked by prominent, subangular, radiating striæ, increasing by bifurcation, of uniform size at the margins, where there are twelve in the space of 5 mm.; a short distance below the beak there are twenty in the same space. The radii are crossed by fine indistinct concentric striæ, which on many specimens are obsolete; also, at irregular intervals, by lines or varices of growth. On the cast of the dorsal valve the distance from the beak to the lower margin of the muscular impression is about one-half the length of the valve. Impression ovate in outline; width equal to or very slightly less than the length, with a deep depression along the middle. On the ventral valve the impression is ovate, bilobed. The margins are distinctly lobed in four divisions. The greater portion of the specimens observed have a diameter of from 20 to 25 mm. This species may be distinguished from *Orthis impressa*, of this formation, by its smaller size and its more circular outline; from *Orthis tioga*, by its more circular outline, less conspicuous sinus and elevation, and ovate muscular impression. *Formation and localities.* Chemung group, Sullivan township, Tioga county; P. and E. Railroad, between Ludlow and Wetmore, and Kinzua creek near west line of McKean county; and at various other localities in Pennsylvania.—*VIII g.*—NOTE. In Randall's collections at Warren, Pa., specimens 9520 A, 9522, 9523, 9524, wrongly labelled *Orthis mechelini.*—*Chemung-Catskill*, *VIII-IX.*

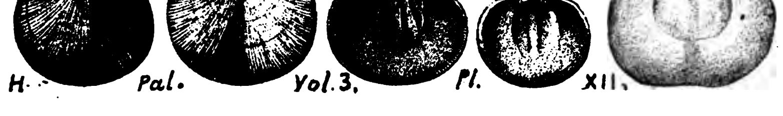
Orthis perelegans, Hall, Pal. N. Y. Vol. 3, 1859, plate 13, fig. 9 a, ventral, and 10 b, dorsal valve. *Lower Helderberg* formation.—In Pennsylvania, (Cat. OO, p. 234), specimens 601–18, and 603–3 (four) in collections at and near Orbisonia, Huntingdon Co., Pa. from *Lower Helderberg*, *VI.*—Dr. Barrett's collections at Port Jervis, from *Stormville shales.* G6, p. 132.—*VI.*



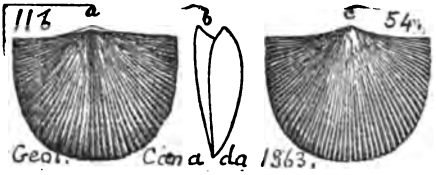
Orthis pervetus, Conrad. Proc. Acad. Nat. Sci. Phila. Vol. 1, 1843. *Black river Trenton formations*, *II c.*—Geology Canada, 1863, page 130, figs. 57 *a*, *b*, *c*, *d*, *e*, different views of two separate specimens from the Canadian *Chazy formation*, *II b.*



Orthis planoconvexa, Hall, Pal. N. Y. Vol. 3, 1859, plate

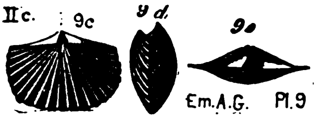


12, fig. 3, dorsal valve; 4, dorsal interior; 5, ventral interior; 6, cast of a dorsal valve. *Lower Helderberg.* Dr. Barrett collected it from the *Stormville shale* near Port Jervis on the Delaware river (G. 6, p. 132.)—*VI.*



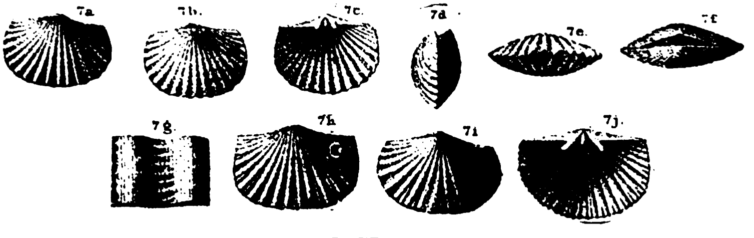
Orthis platys, Billings, Can. Nat. & Geol. Vol. 4, 1859, Geology of Canada, 1863, page 129, figures 54 *a*, dorsal valve; *b*, long section to show the curvature of the two valves; *c*, ventral valve. *Chazy. II b.*

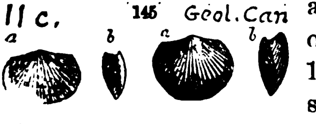
Orthis plicata. See **Spirifera vanuxemi.** *VI.*



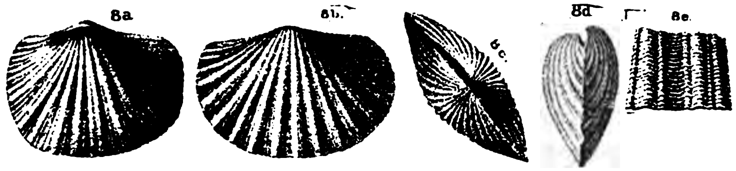
Orthis plicatella (Hall, Pal. N. Y. Vol. 1, 1847, Trenton and Hudson river groups.) Emmons, Amer. Geol. I, ii, 1855, p. 193, plate 9, figs. 9 *a* to *e*. Rather small shell, with nearly equal valves; 24 simple folds, more or less in different specimens.—*II c.* Trenton limestone formation.—Also, Pal. Ohio, Vol. 1, 1873, page 108, plate 8, fig. 7*a* to *j*.—*III b.*

Orthis plicatella, Hall. Pal. N. Y. Vol. 1, 1847, *Trenton*

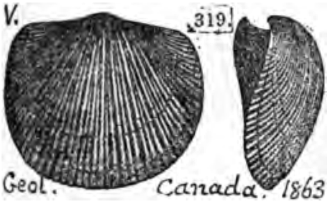




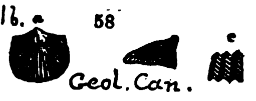
and Hudson river formations.—Geology of Canada, 1863, page 165, figs. 145 *a*, *b*; *a*, *b*, different views two specimens from the *Trenton limestone* of Canada. *II c.* — Pal. Ohio, Vol. 1, 1873, page 108, plate 9, fig. 7 *a*, *b*, ventral, dorsal valves; 7 *c*, inside dorsal; 7 *d*, *e*, *f*, profile, front, back (hinge) views; 7 *g*, *enlarged* surface to show cross striæ between the ribs, and minute traces of longitudinal striæ on and between the ribs; 7 *h*, *i*, ventral and dorsal valves, intermediate between this species and its variety (below); 7 *j*, inside of dorsal valve.—*Cincinnati group, III.*



Orthis plicatella, var. **triplicatella** Hall, Pal. Ohio, Vol. 1, 1873, page 109, plate 8, figs, 8 *a b* dorsal ventral, 8 *c*, hinge view, to show thevery low area, as compared with the species figs. 7 *f* and 6 *c*; 8 *d*, profile 8 *e*, magnified surface of shell.—*Cincinnati group*, *III*.



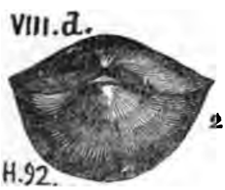
Orthis porcata, McCoy. Silurian Fossils of Ireland, 1846. *Trenton*, *Hudson river* and *Middle Silurian*. Geology of Canada, 1863, page 312, figs. 319 *a*, *b*, dorsal and side views of a specimen from the *Medina-Clinton* series of West Canada. *IV–V*.

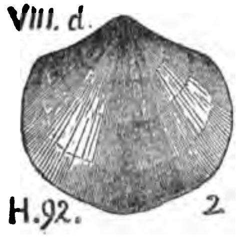


Orthis porcia, Billings. Canad. Nat. & Geol. Vol. 4, 1859 Geology of Canada, 1863, page 130, figs 58 *a*, ventral valve; *b*, side view; *c*, *magnified* portion of surface of shell. *Chazy formation*, *II b*.

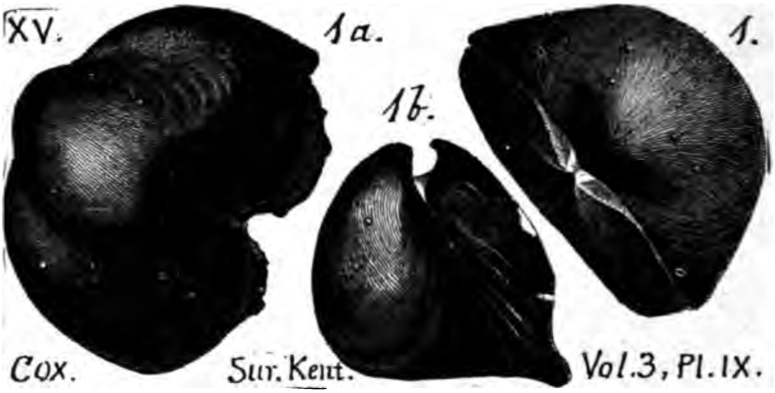
Orthis punctostriata, Hall, Pal. N. Y. Vol. 2, 1852, *Niagara*, *V b*.—Specimen 604–6 (OO, p. 234) in collections of Fellows & Genth, 1875, at Mansing's quarry, near Hazardville Carbon Co., Pa., from what we call *Lower Helderberg beds*, *VI*.'

Orthis quadricostata. See **Rhynchonella quadricostata**, *VIII e*.

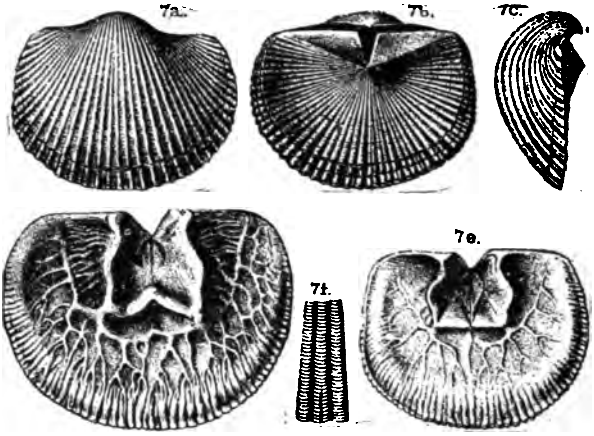




Orthis resupinata. (*Anomites resupinatus; Spirifera resupinata; Terebratula resupinata; Orthis tulliensis.*) Hall, page 215, fig. 92, 2. Vanuxem, page 163, fig. 41, 2. (Pal. Foss. xxvii, f. 115.) (Martin, Petrefact. Derb. Carboniferous.) *Tully limestone formation. VIII d.*—In Columbia Co., Pa., between Catawissa and Bloomsburg (Sect. 78, G7, p. 287) it occurs in bed 71. (200′ above the top of the *Genesee*), in *Chemung*, *VIII g.*

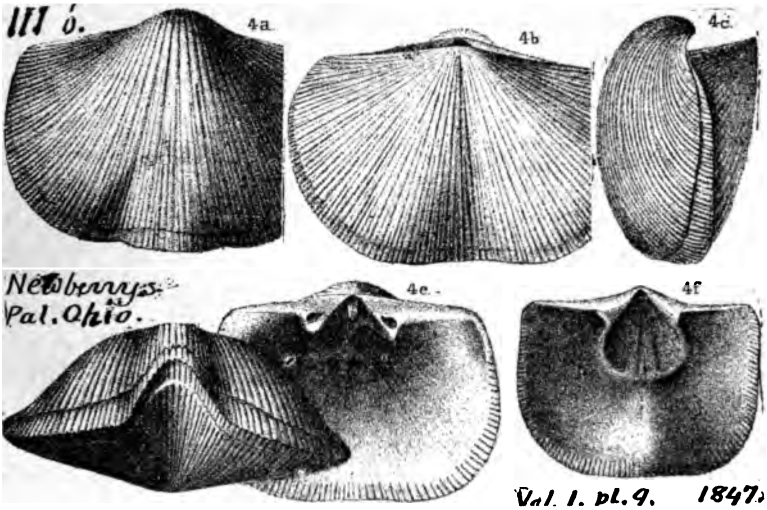


Orthis resupinoides, Cox, Geol. Sur. Ky., Vol. 3, 1857, page 570, plate 9, fig. 1, cardinal view; 1 *a*, ventral valve; 1 *b*, profile view. In roof shade of coal No. 11, at Hardesville, Hancock Co., Ky. *Upper Coal measures. XV.*



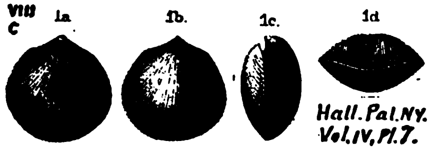
Orthis retroasa? Salter, Geol. Survey of Great Britain, 1858. Pal. Ohio, Vol. 1, 1873, page 92, plate 11, figs. 7 *a*, dorsal view; 7 *b*, ventral, showing the area strongly inclined forward, and the foramen with beak and area of dorsal valve; 7 *c*, profile; 7 *d*, ventral interior, larger specimen, strong muscular cavity, complex vascular markings; 7 *e*, same smaller specimen, with differences suggestive of another species; 7 *f*, *magnified* surface.—*Cincinnati group*, *III.*

Orthis sinuata, Hall, Pal. N. Y. Vol. 1, 1847, *Hud. River*.

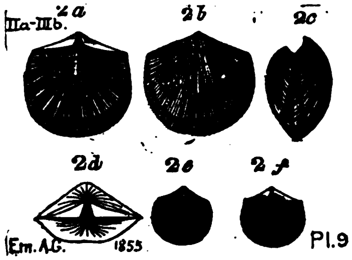


Pal. Ohio, Vol. 1, 1873, page 96, plate 9, fig. 4 *a*, dorsal view of large specimen; 4 *b*, ventral; 4 *c*, profile; 4 *d*, front; 4 *e*, inside of dorsal; 4 *f*, inside of ventral valve.—*Cincinnati*, *III*.

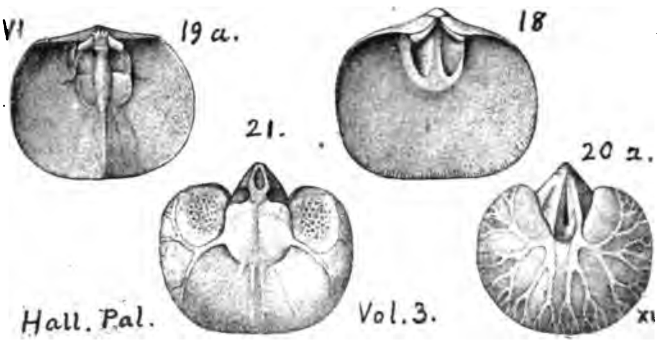
Orthis solitaria, Hall, 13th. An. Rt. 1860; Pal. N. Y., Vol. 4, 1867, page 45, pl. 7, fig. 1*a*, dorsal; 1 *b*, ventral valve; 1*c*, profile; 1 *d*, hinge. (*Compare O. lenticularis*, Van. to which this is so similar. *Hamilton*.—Perry Co. (OOO, spec. 12,819) *Marcellus*. *VIII b*, *c*.



Orthis subæquata, (Conrad, Proc. Acad. Nat. Sci. Phila. 1843, Vol. 1; *Chazy* to *Trenton* groups.—Emmons, Am. Geol. I, ii, 1855, 194, plate 9, figs 2 *a* to *f*. Differing from *Orthis testudinaria* merely in the nearly equal convexity of its valves. Emmons. *O. subœqualis* is occasionally found in some of the *Trenton beds*. C. E. Hall, T3, 367.

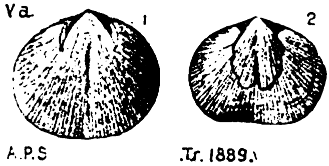


Orthus subcarinata, Hall. Pal. N. Y. Vol. 3, 1859, p. pl. 12, fig, 18, dorsal interior; 19 *a*. ventral interior; 20 *a*, dorsal cast; 21, ventral cast.


VI
19 a.
18
21.
20 a.
Hall. Pal.
Vol. 3.
XII

Lower Helderberg. Recognized by Dr. Barrett in the *Stormville shale* or upper division of the Lower Helderberg formation about Port Jervis. G6, p. 132.—*VI.*

Orthis subcircula. *New species.* Simpson, Trans. Amer. Philosophical Soc. 1889, Vol. page—fig. founded on specimens 501-30, 41, 42. (OO Cat.) in Hale and Hall's collections; also 877–1, 878–1, 882–2, 6, got at the McKee's ore bank in Mifflin Co., Pa. Also at Orbisonia ore banks in Huntingdon Co., Pa.—*Clinton, Va.*



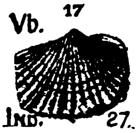
Shell broadly oval, nearly circular; height usually about three-fourths the width; greatest width just below the middle; cardinal line short, length less than half the width of the shell; extremities curving outward, the lateral marginc abruptly rounded, and the basal margins broadly rounded; on the ventral valve slightly constricted at the middle. Dorsal valve flattened, greatest convexity a little below the beak, gently sloping to the front and lower lateral margins, more abruptly curving to the cardinal extremities; at the middle of the base a shallow depression, which continues about one-half of the distance to the beak. Ventral valve more convex, greatest convexity about one-third the length from the beak; beak incurved and projecting beyond the area line.

Surface marked by conspicuous radiating striæ, which are sometimes of uniform size, but usually near the base there are very fine alternating striæ. The large striæ are marked at in-frequent intervals by elongate pits or openings. The radiating striæ are crossed by fine, indistinct concentric striæ, and at greater intervals by distinct lines or varices of growth.

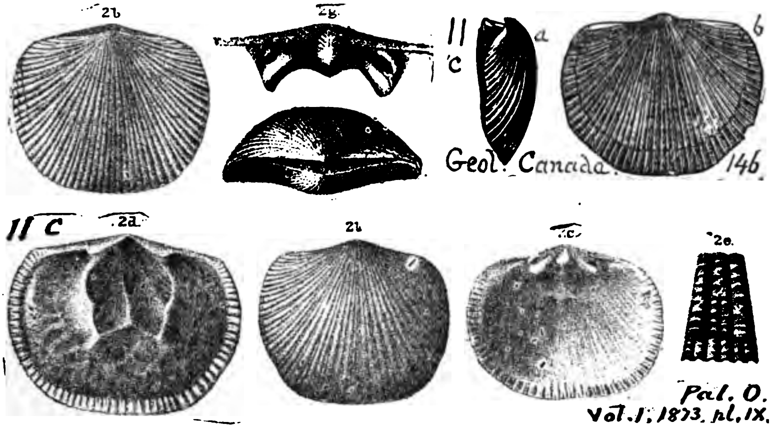
On the casts of the interior of the ventral valve the muscular impression is ovate in outline, the length equal to more than two-thirds that of the shell; width two-thirds the length; bilobed by the callosity of the adductor muscle. The sides are somewhat distinctly lobed in three divisions.

This species most closely resembles *Orthis circulus* of this formation, but the valves are inequal, the outline less circular, the greatest width being below the base, and is constricted at the base. The muscular impression is larger.

Formation and locality. Clinton group, above fossil ore, from McKee's ore bank, seven miles north-west of Lewistown, Mifflin county; also, ore mine north of Black-log creek, Orbisonia, Huntingdon county, Pennsylvania. *V a.*



Orthis subnodosa, Hall. Figure from Collett's Indiana Report of 1881, page 286, plate 27, fig. 17, ventral valve, showing the nodose or knotty character of the plications or folds.—*Niagara, V b.*

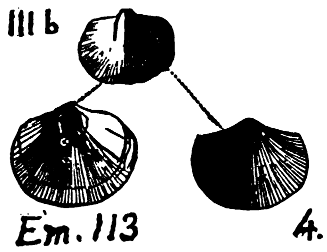


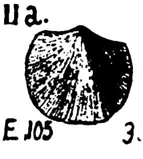
Orthis subquadrata, Hall. Pal. N. Y. Vol. 1, 1847. *Trenton* and *H. River*—Geol. Canada, 1863, p. 165, fig. 146 *a*, *b*. *Trenton.*—Pal. Ohio, Vol. 1, 1873, p. 94, plate 9, fig. 2 *a*, (*b*, on the plate an error), dorsal valve; 2 *b*, ventral; 2 *c*, inside dorsal; 2 *d*, inside ventral, showing hinge teeth, etc.; 2 *c*, *magnified* surface; 2 *f*, hinge view; 2 *g*, *magnified* hinge margin. Centre Co. Pa. doubtful, (T4, page 427), cast in *III b*.

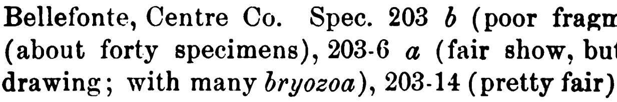
Orthis tenuidens, Hall, Pal. N. Y., Vol. 2, 1852, *Clinton formation*. Found in Pennsylvania along the outcrop of the *fossil ore bed*, McKeesville, Mifflin Co., specimens 501-35; 502 1 (a slab with numerous valves), 502-2 (the reverse of the same slab), 502-26, -28; -36, -38; Bell's Mills, 506-7 8 9. *V a*.

Orthis tenuistriata, Hall, Geology of the Fourth District of New York, 1843, page 245, fig. 107, 3. *Portage formation*, *VIII f*. This and *Spirifera levis* are the only two brachiopod shells in the New York formation. (J. H.)

Othis testudinaria. Emmons, page 394, fig. 105, 3. Emmons, page 404, fig. 113, 4. Rogers, page 818, fig. 601. II c. Trenton formation; also in Pennsylvania *III b*. Loraine (Hud. Riv.) formation. (Dalman Vet. Acad. Hand. 1827.)—Owen, Geol. Wis, etc., 1852, pl. 2 B, figs. 6, 7, 14, 15, from Ohio. — Found in Pennsylvania in Mifflin Co., Kishicoq. valley, 7 m. above Reedsville, opposite D. Campbell's, Spec. 202-1 (poor fragments), 202-2 (excellent cast, for illustrating the fossil), 202-4 (poor), all in *Trenton lime*. *II c.* — Also at Bellefonte, Centre Co. Spec. 203 *b* (poor fragments), 203-1 (about forty specimens), 203-6 *a* (fair show, but not fit for drawing; with many *bryozoa*), 203-14 (pretty fair), 203-27 (fair for drawing), 203-28 A (dorsal valve, suggestive), 203-30 A (a fairly good dorsal valve) 203-31, 203-36 B (small fragments), 203-38 (small and poor), 203-40 (many, poor), 203-41 (interiors, fragmentary, with *bryozoa*), 203-43, 203 46. — Also in Mifflin Co. near Reedsville, Spec. 204-12 (dorsal valve) 204 15.—

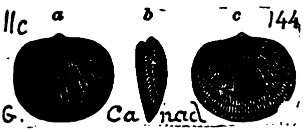






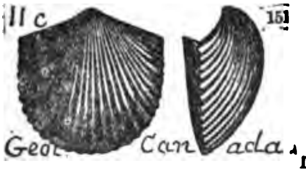
Also in Fellows' collections at Bellefonte, Spec. 210-3 B, -4 (several), -7 (ventral, and cast of dorsal), -8 (good interior, ventral), -9 (good to draw), -11 (poor), -18 (very poor), -26 (possibly *Zygospira modesta ?*) -27 (very good ventral interior), -28 (fair), -29 (good interior), -48 (poor), -66 (*a slab covered with shells*), -82 *a* (poor), -98 (poor), -111 (several very good), -116 *c*, -117 *a* (fragments), -136 (fair, eleven indiv.), -147, -149 *b*, -154.— Also in Fellows' coll. 1876, on hill top, road from Tyrone Gap to Warrior's Mark, N. of Tyrone forges, Huntingdon Co., Pa. Spec. 212-4 (a specimen of *Trenton limestone* 3 inches square, with about ten individuals in it), 212-5, 212-6.—In Northampton Co. this shell is sparingly seen at A. Knecht's, ¼ mile S. W. of Stockertown, close to the Bushkill creek; it is numerous in the lower beds of the Churchill quarry, under the *encrinal beds*. Colonies of it are to be seen at Howell's cotton mill on the Delaware river. A few were found among the encrinite stems in the J. Russ quarry at Nazareth. D3, pp. 162, 165.—In Huntingdon county it crowds some of the Trenton beds. (C. E. Hall, T3, 367.)—In Centre Co. Ewing finds it both in the *Trenton* and in the *Hudson river* formations. T4, 424, 427.—*II c*, *III b*.—In Perry Co. Claypole's two specimens 12,828 were found in *Hudson river slate*.—*III b*.

Orthis testudinaria, Dalman. Vet. Acad. Hand. 1827.—*Trenton and Hud. Riv. Gr. IIc*, *IIIb*. Geology of Canada, 1863, page 165, figs. 144 *a*, *b*, *c*.—*Trenton limestone*, *IIc*.

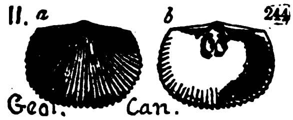


Orthis tioga, (*Orthis interlineata*) Hall, Geol. 4th District. page 267, fig. 121, 3, 4. *Chemung*, (Pal. N. Y. Vol. 4, 1867. *Portage and Chemung* formations.)—Found in Pennsylvania, at Dingman's Creek Falls, near Dingman's Ferry, Pike Co., Fellows' collections, spec. 808–2; and along canal, north of Port Jervis, Orange Co., N. Y. Hall and Fellows' coll. spec. 809–1,–5 (two); also in *Hamilton strata*, *VIII c*.—In Perry Co. Claypole's doubtful spec. 64–8, Shermandale. *VIII-IX*.—In Columbia Co. in *Stony Brook group* (G7, p. 72.)—*VIII g*.

Orthis tricenaria, Conrad, Proc. Acad. Nat. Sci. Phila. Vol. 1, 1843, *Trenton.* Geology of Canada, 1863, page 167, fig. 151 *a*, *b*. At Bellefonte, Spec. 210–138 (seventeen poor specimens), 210–140 (three young individuals.) Little Juniata river above Tyrone Forges, 211–S (interior of dorsal valve). (C. E. Hall, T3, p. 367.) (Ewing, T4, p. 424.)—*II c.*



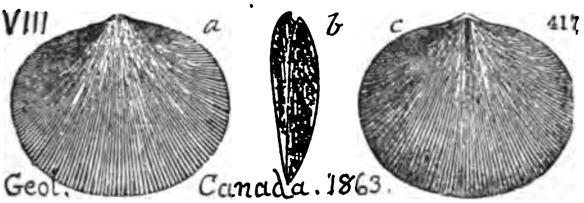
Orthis tritonia, Billings. Pal. Foss. Vol. 1, 1872. Geology of Canada, 1863, page 231, figs. 244 *a*, exterior of dorsal valve; *b*, interior of the same specimen from the *Quebec group II?*



Orthis tulliensis. See **Orthis resupinata.** *VIII, d.*

Orthis unguiculus (*Spirifera unguiculus.*) See **Ambocoelia umbonata.**—It occurs with many other Chemung shells at bridge over Crowley's run, Erie Co. Q4, p. 283.— *VIII g.*

Orthis vanuxemi. Hall, Tenth Reg. Rt. N. Y. 1857. Geology of Canada, 1863, page 384, figs, 417 *a*, *b*, *c*, ventral side, and dorsal views of a specimen from the W. Canada *Hamilton formation*, *VIII c.* Spec. 808–2, –24, from Dingman's Falls, Pike Co. *Hamilton*, *VIII c.*—869–8, from LeBoeuf quarry, Erie Co., Pa. (OO, p. 237) in *Third Oil Sand* or *Panama conglomerate*, *Upper Chemung*, *VIII g.* [NOTE. — All three were verified specially by J. Hall, Nov. 1888.—In Perry Co. at Barnett's Mill (OOO, spec. 11,759) in *Hamilton upper shale.*—In Huntingdon Co., numerous in the *bottom Hamilton beds* (just over *Marcellus*) at Goodman's near Huntingdon (T3, p. 258.) Also in *Hamilton lower shales* at the Coffee run railroad quarry (T 3, p. 112.—In Columbia Co., Little Fishing creek section (G7, p. 75) it has several horizons; one in the *Tully limestone*; and two in the *Hamilton upper*

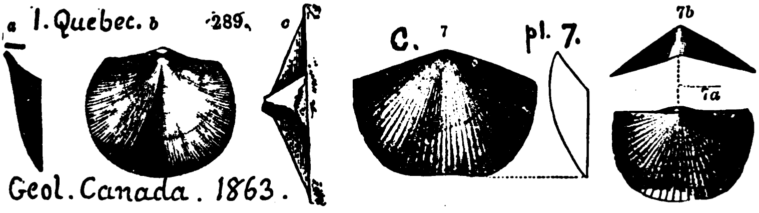


slates (OOO, 12,181.)—*VIII c, d.* Not the same as *O. vanuxemi* Winchell, 1862, from the *Portage.*

Orthis —— ? See specimens in Catalogue Vol. OOO, 501–41; 808–24, 809–9; 855–41, 46, 47; 877–1, 878–1, 882–2, 6.—Also Cat. O, Spec. 2985, 2986, 3000, 3149, 3146, all in Venango Co. under *XII.*—Also 3178, with *Rhynchonellas,* Snodgrass quarry, Crawford Co. *XII.*—3211, 3223, ditto Franklin, *XII.*—3238, Balmburg, O. *X.*—3241, Sharpsville, *X.*—3282, Wilcox, McKean, *X.*—3308, Oil creek, *X?*—3333, Pleasantville, *X?*—*Orthis* occur in the *Shenango shale, Crawford shales, Shenango sandstone,* Q3, 60, 61, 124, Mercer Co. *X.*—Usually broken in *Sub-olean conglomerate,* Q4, 79, Crawford Co. *X.*—Undescribed species of *Kinderhook limestone facies* abound in *Meadville limestone* beds in many places of Crawford Co. *X.*—At Corry in *Corry sandstone,* Q4, 230, *X.*—In bed 15 of Falls run section (200′ beneath *Third Oil sand*) Erie Co. Q4, 250. *VIII g.*—In Bedford Co. *O. tioga?* top of *VIII* at Saxton; *shales over Upper Chemung Conglomerate,* T2, p. 78, 228. Also *Orthis* in upper part of *L. Held.* p. 88, and on weathered surfaces near New Paris, p. 121. Also east of Luthern church, Imlentown road, p. 156, Also abundant on Martin's ridge near State line, p. 159. *VI.*—Over fossil ore, County farm, p. 140, and in ore shales, Yellow creek, p. 198. *V.*—In Huntingdon, in *Cypricardia bed,* east mouth of Sideling hill railroad tunnel, T3, p. 87, *IX-X;* and abundant in bottom 30′ of 100′ black shale Shoup's run, *X.* Also in *Coral beds* Powell's quarries 30′ below top of *Low. Held.* p. 123, *VI.*—Occasionally in some of the *Trenton* beds on Little Juniata, p. 367, *II c.*—In Centre Co seen by Ewing in *Clinton,* T4, p. 429. *V.*

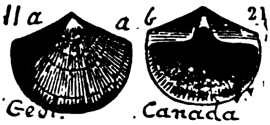
Orthisina crassa. See **Hemipronites crassus.** *XIII.*

Orthisina festinata, Billings. Pal. Foss Vol. 1, 1861, page



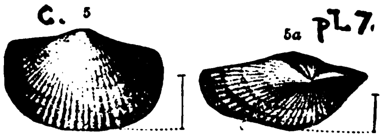
10, fig. 11. *Pots dam.*—Geol. Vermont, Vol. 2, p. 949, f. 350, 351, 352.—Geol. of Canada, 1863, page 284, figs. 289*a*, side view; *b*, ventral value; *c*, enlarged area of the same valve of a specimen from the "*Pots dam sandstone*" of the *Quebec group* (Logan.)—Walcott, Bull. No. 30, U. S. G. S. page 120, plate 7, fig. 7, Ventral (?) valve and section, *nat. size;* 7 *a*, dorsal (?) valve, *enlarged;* 7 *b*, view of its area.—*Lower Cambrian* (*Georgian*) formation; three localities in Vermont.—*L. C.*

Orthisina grandæva, Billings. Can. Nat. & Geol. Vol. 4, 1859. Geology of Canada, 1863, page 113, figs. 21 *a*, ventral valve; *b*, another ventral valve showing the area and foramen, *Calciferous sandstone. II a.*

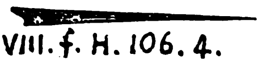


Orthisina orientalis. Whitfield, 1884, Bull. A. M. N. H. I. p. 144, pl. 14, f. 6. Walcott, Bull. 30, U. S. G. S. page 120, plate 7, fig. 6, ventral valve, natural size, (Whitfield.)—*Lower Cambrian* formation, two localities, Vermont. *L. C.*

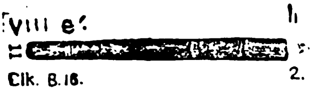
Orthisina (?) transversa. Walcott, Bull. U. S. G. S. No. 30, page 121, plate 7, fig. 5, ventral valve, *enlarged twice;* 5 *a*, another showing area. —*Lower Cambrian* formation, Georgia, Vt. *L. C.*



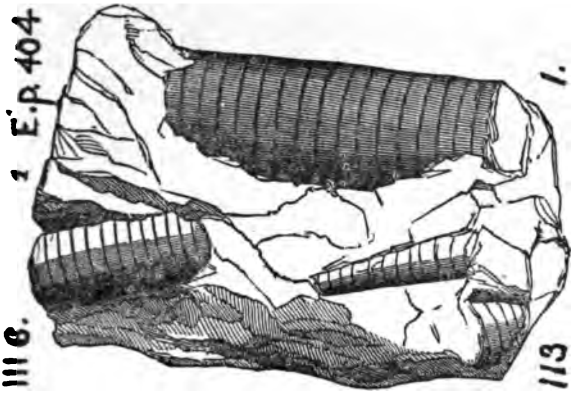
Orthoceras aciculum, Hall. Geol. 4th District of New York, 1843, p. 243, fig. 106, 4. *Portage.* (*See figures under* **Coleolus aciculus.**) Spec. 202–4, Mapleton, Huntingdon Co., Pa. T3, 108. *Upper Genesee. VIII d.*


VIII. f. H. 106. 4.

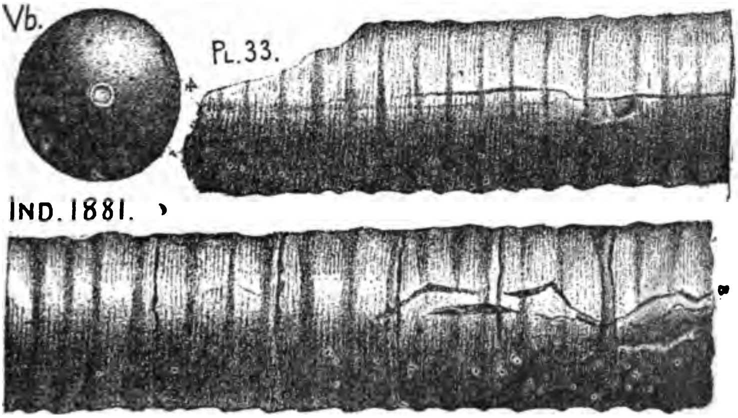
Orthoceras aciculoides. Clarke, Bull. 16, U. S. G. S. 1885, p. 51, pl. 2, fig. 11, *twice the natural size;* six septa unusually far apart; species quite distinct from any other Devonian *Orthoceras.* See **Coleolus aciculus.** *Naples shales.—VIII e.*



Orthoceras æquale. Emmons Report on the Geology of the Second District of the State of New York, 1842, p. 404, fig. 113, 1. *Trenton formation, II c.*

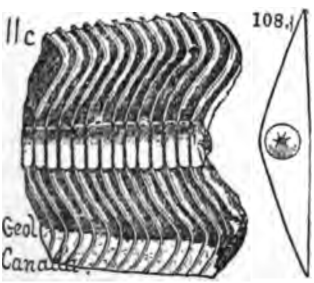


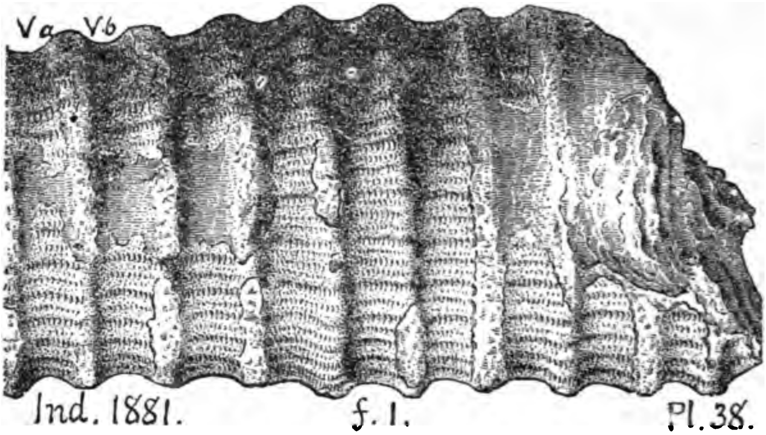
Orthoceras amycus, Hall. Trans. Alb. Inst. Vol. 10, 1879.

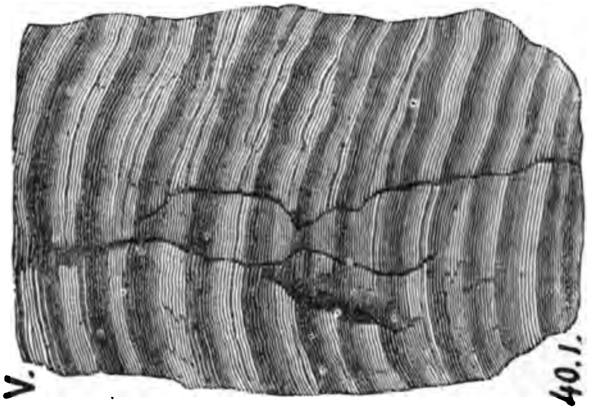

Vb.
PL.33.
IND.1881.

Collett's Indiana Report of 1881, p. 324, pl. 33, figs. 3, 4. Differs from *O. annulatum* in taper, &c. *Niagara, V b.*

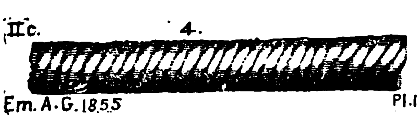
Orthoceras anceps, Hall. Geology of Canada, 1863, p. 150, fig. 108 *a*, specimen showing the siphuncle and septa separating the chambers; *b*, cross section showing the flattened shape of this cephalopod shell, and the position of the siphunclar channel of communication between the chambers. *Trenton limestone, II c.*




Va Vb
Ind. 1881.
f. 1.
Pl. 38.

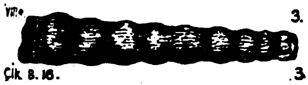


Orthoceras annulatum. (*Orthoceras laphami*, and *Orthoceras nodocostatum*, of McChesney, 1860, New Pal. Fossils, pp. 90, 94; also, Trans. Chicago Ac. S. Vol. 1, p. 53, pl. 9, fig. 5.) Collett's Indiana Report of 1881, p. 358, pl. 38, fig. 1 (cut off to get into this page), ***natural size***, showing surface markings a little too strongly.—Hall, Geol. N. Y. p. 110, fig. 40, 1. (Sowerby, Min. Conch., Vol. 2, p. 133, pl. ix, f. 5, 1818.) *Clinton and Niagara formations*, *V a*, *b*.—See, also, Pal. Ohio, Vol. 2, 1875, p. 147, pl. 9, fig. 1.—*V b*.

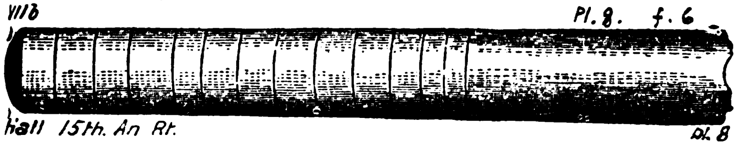


Orthoceras arcuoliratum. (Hall, Pal. N. Y. 1847, Black River and Trenton). Emmons, Am. Geol. I, ii, 1855, 149, plate 12, fig. 4; spiral, slightly elevated waving ridges, separated by spaces equal to their breadth, and finely striated lengthwise.—*Trenton. II c.*

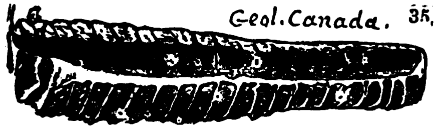
Orthoceras asmodeus. Clarke, Bull. 16, U. S. G. S. 1885, p. 30, pl. 3, fig. 3, *magnified 30;* minute; only $\frac{1}{16}$ inch long; beautiful; different from all other Devonian *orthocerata;* rings marked by the finest lines lengthwise; no septa visible. *Genesee* black shale, Ontario Co., N. Y.— *VIII e.*


VIII e.
3.
Clk B. 16.
.3

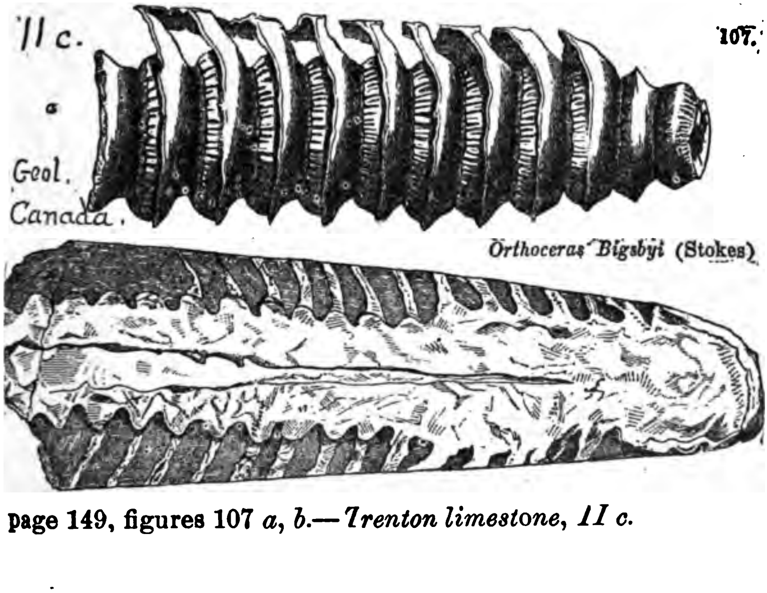
Orthoceras baculum, Hall, 15th An. Rt. N. Y. 1862, p. 74, plate 8, fig. 6. Siphuncle excentric; surface unknown. Shape wonderfully cylindrical, scarcely tapering at all; largest specimen nearly an inch thick. *Schoharie grit. VII b.*



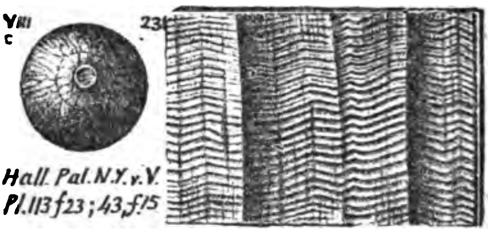
Orthoceras becki, Billings. Can. Nat. & Geol. Vol. 4, 1859. Geology of Canada, 1863, page 121, fig. 35. *Calciferous sandstone, II a.*



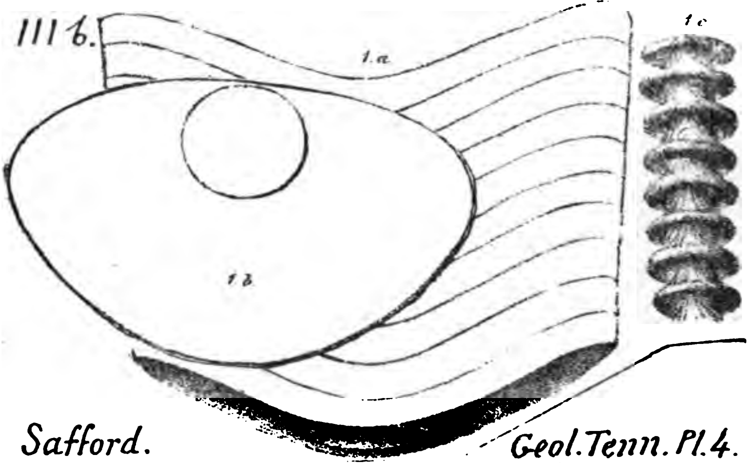
Orthoceras bigsbyi, Stokes. Geology of Canada, 1863, page 149, figures 107 *a, b.*— *Trenton limestone, II c.*



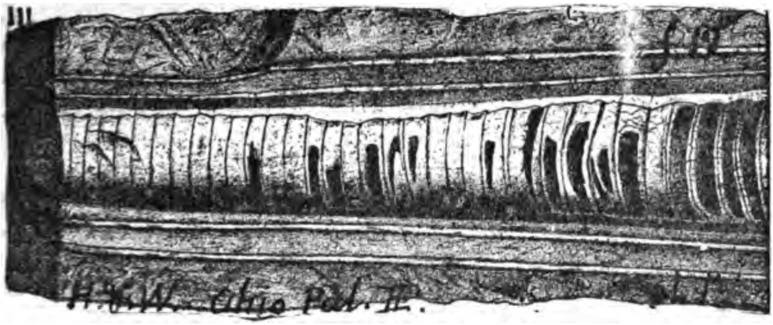
Orthoceras cælamen (in part equal *O. nuntium*, and *O. crotalum*, which see.) Hall, Pal. N. Y. 1879, page 298. pl. 113, f. 23, pl. 43, f. 15; differing from the other two species in ornamentation, frequency of rings, etc. Muttonville and Moravia, N. Y. *Hamilton*—In Pennsylvania, OO, p. 235, Marshall's Creek, Monroe Co. F. & G. collections, Spec. 804–52, 804–63, in *Hamilton beds*, *VIII c*.



Orthoceras capitolinum. Safford. Geol. Tenn. 1869, page 290, plate 4, (G3.) figs. 1 *a*, to 1 *c*; intermediate in character between *O. bigsbyi* and *O. conceps*. Found in the *Middle Knoxville* (*Lower Hudson river*) formation of Central Tennessee. *III b* (*a?*)

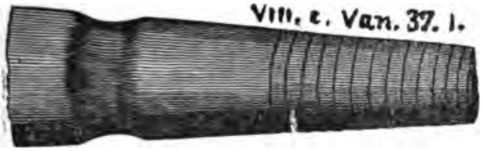


Orthoceras carleyi, H. & W. Pal. Ohio, Vol. 2, 1875, page 98, plate 4, fig. 19, an interesting imperfect specimen of a tube of separate chambers enclosed in two other tubes; the spaces between the inner and middle tubes filled with finely ground-up organic remains; that between the middle and outer, with fine silt, and in places with crystalline matter; the chambers either empty, or filled with crystalline matter; possibly the

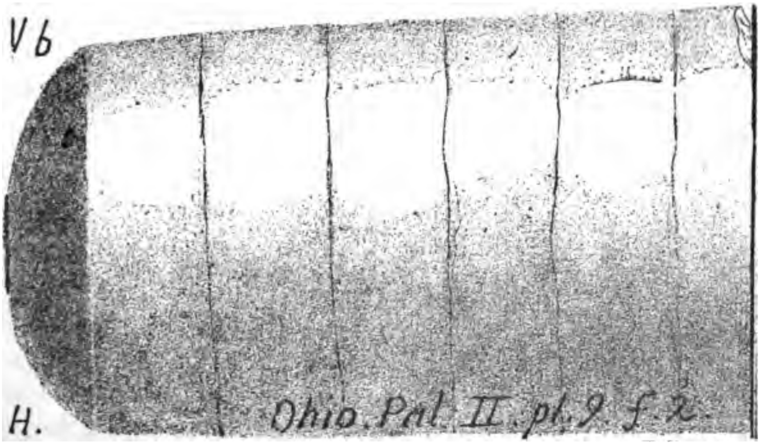


middle and outer tubes were the last or living chamber accidentally pressed back over the inner tube. It would have been an *Endoceras* if the small end had been solid and large end chambered. Found at Fayetteville, O., in a fragment of limestone made up of finely-broken organic remains, belonging to the upper part of the *Hudson River*. *III b.*

Orthoceras constrictum, Vanuxem. Geol. 3d. Dist. N. Y. page 152, fig. 37, 1. *Hamilton*. (Conrad. Ann. Rt. N. Y. 1838.) —In Pennsylvania, Monroe Co. Spec. 804–20, and Pike Co. Spec. 808–19; both from *Hamilton*, *VIII c.*

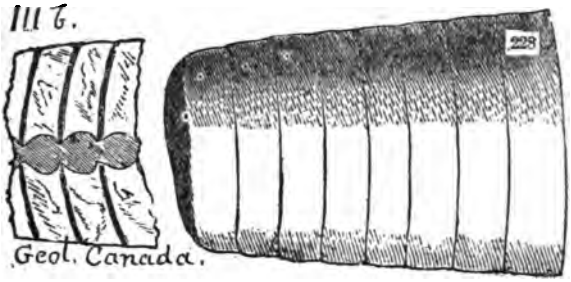

VIII. c. Van. 37. 1.

Orthoceras crebescens, Hall, 20th Regents' Rpt. N. Y.

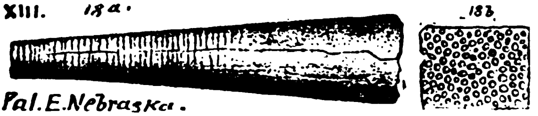

V b
H.
Ohio. Pal. II. pl. 9 f. 2.

1867, *Niagara.*—Pal. Ohio, Vol. 2, 1875, p. 148, pl. 9, fig. 2, a cast of the interior, like all other specimens obtained from the *Niagara limestone strata* at Cedarville, O., and also from more western localities, where the species was first described. All are more or less pressed into oval cylinders.—*V b.*

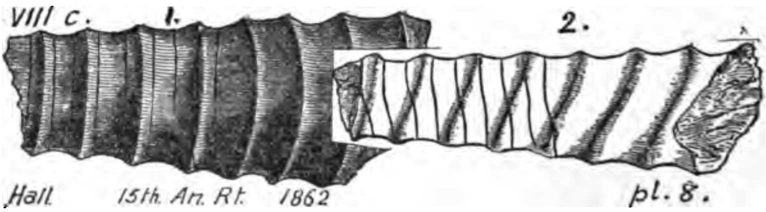
Orthoceras crebriseptum, Hall, Geology of Canada, 1863, page 218, fig. 228.—*Hudson river* (*Loraine shale*) *formation*, *III b.*


III b.
228
Geol. Canada.

Orthoceras cribrosum, Geinitz, Pal. of E. Nebraska, by Meck, 1866, page plate 11, fig. 18 *a*, slightly reduced from Geinitz's enlarged figure; *b*, *enlarged* pitted surface. *Coal measures* and *Permian.*—Reported by I. C. White from *Pine creek limestone* at Smith's Ferry, Beaver Co., Pa.—Also from *Ferriferous limestone* at Smith's Ferry; in Lawrence; in Mercer; in North Butler. Q. 33, 62, 264; Q2, 47; Q3, 25; V, 147.—Doubtfully in *Sharpsville sandstone*, Mercer Co. Q3, 62.—Also in *Decker's creek shale* under Mahoning sandstone, Morgantown. L, 37.—Also in Barren measure *Black fossiliferous limestone*, Fayette Co. L, 36.—*XIV.*



Orthoceras crotalum, Hall. 15th Annual Report, 1862, page 78, plate 8, fig. 1, ordinary form and condition; 2, variety



(or species?) having direction of septa and rings coincident. A specimen about ½ in. thick has 7 or 8 septa to the inch; rings cross so that half the ring is on one chamber and half on the next lower chamber. *Hamilton soft shales* on Seneca and Cayuga lakes and elsewhere in N. Y.—*VIII c.* In Pennsylvania recognized by Hall in Spec. 808-18 (OO, p. 235) Fellow's Coll. at Dingman's falls, Pike Co., Pa., in *Hamilton rocks, VIII c;* and by Stevenson in the upper Devonian strata in the gaps of Fayette and Westmoreland Cos., Pa.—*VIII-IX.*

Orthoceras demus, Hall. Pal. N. Y. Vol. 5, 1879, page 311,

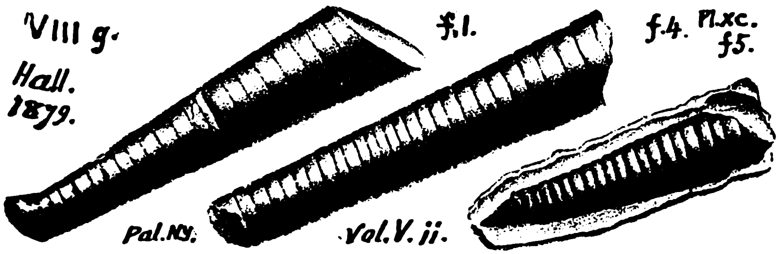
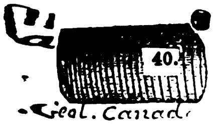
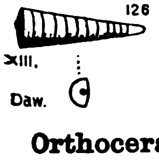


Plate 90, figs. 1, 4, 5; found, associated sometimes with *O. fulgidum,* in lime shales at Ithaca and Philipsburgh, N. Y. *Chemung.*—Claypole's specimen 53-26 (OOO, 12,009) on New Bloomfield road to Carlisle, Perry Co. Pa. *Chemung, VIII g.*

Orthoceras deparcum, Billings. Geology of Canada, 1863, page 121, fig. 40. *Calciferous sandstone. II a.*

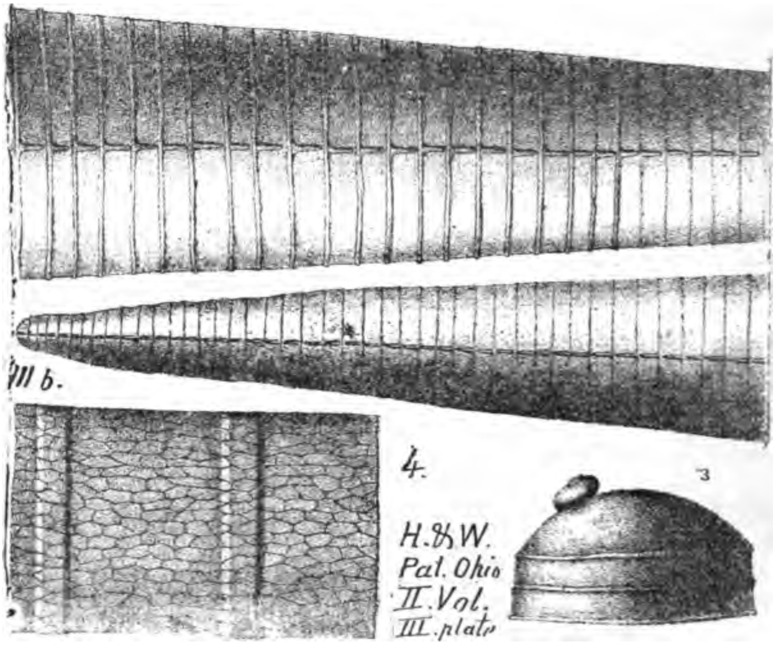


Orthoceras dolatum, Dawson. Acadian Geology, 18—, page 311, fig. 126; like *O. pygmæum,* DeKon.; flattened on one side; siphuncle near flattened side. *Carboniferous limestone* of Windsor N. S.—*XIII?*

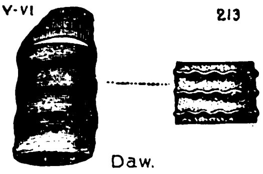


Orthoceras duseri, H. & W. Pal. Ohio, Vol. 2, 1875, page 97, pl. 3, fig. 2, the perfect and type specimen, (fig. cut in half and doubled on itself to get it into this page,) showing all the characters except the outer or last chamber; fig. 3, one septum and a single head of the siphuncle, as seen by breaking the specimen; fig. 4, *magnified* view of the peculiar net work tex-

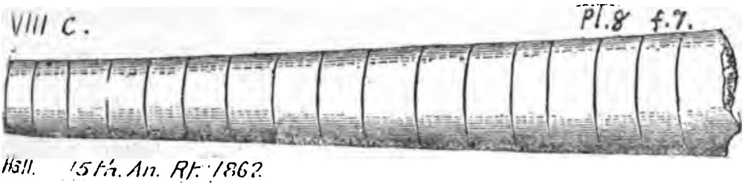
Orthoceras duseri, *continued.*
ture of the surface of the shell, as seen, when well preserved, under a lens; surface appears smooth to the naked eye, except slightly raised edges of septa; net work evidently not produced by the growth of any bryozoon; raised line runs the whole length of one side of the shell. Somewhat like the Anticosti *O. sieboldi,* but has three times as many septa.—Waynesville, O. *Hudson river slate. III b.*



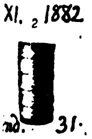
Orthoceras elegantulum, Dawson. Acadian Geology, 1868, page 605, fig. 213, with a portion *magnified;* a beautiful species of *Cephalopod* shell, closely resembling *O. perelegans,* Salter (of the English *Low. Ludlow* formation), cylindrical, slightly flattened; septa very convex, one twentieth of an inch apart; siphuncle central; raised rings covered with hardly visible transverse striæ (16 to a line) which under the lens appear as their sharp parallel curved ridges, with finely granulated intervals. Arisaig, N. Scotia. *V?*



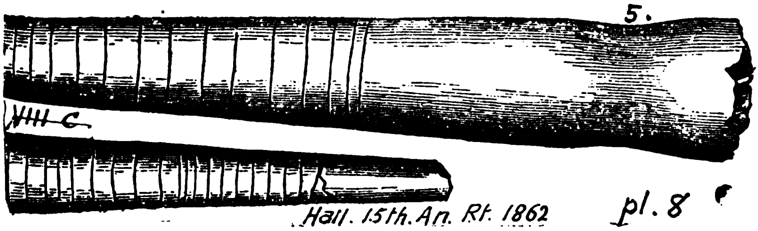
Orthoceras emaceratum, Hall. 15th Annual Report, 1862, (omitted from page 78), plate 8, fig. 7. *Hamilton. VIII c.*


VIII c.
Pl. 8 f. 7.
Hall. 15th. An. Rt. 1862

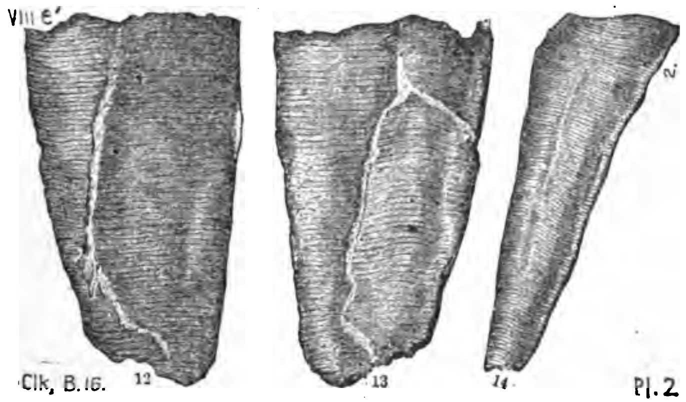
Orthoceras epigrus. (Hall. Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3, Am. Mus. N. H., N. Y., 1882, plate 8, fig. 2.) Collett's Indiana Rt. 1882, page 373, plate 31, fig. 2, *enlarged twice*, type specimen. Resembles *Orthis munsterianum* of DeKoninck, but much smaller, etc. *Subcarb.* Spergen Hill, Ind.—*XI.*



Orthoceras exile, Hall. 15th. Annual Report, 1862, page 78, plate 8, fig. 5. Often mistaken for *O. constrictum*, Vanuxem; but always gently, not apruptly, pinched; septa more distant; siphuncle larger, and always excentric. *Hamilton shales* at Cazenovia, N. Y. and Cumberland, Md.—*VIII c.*

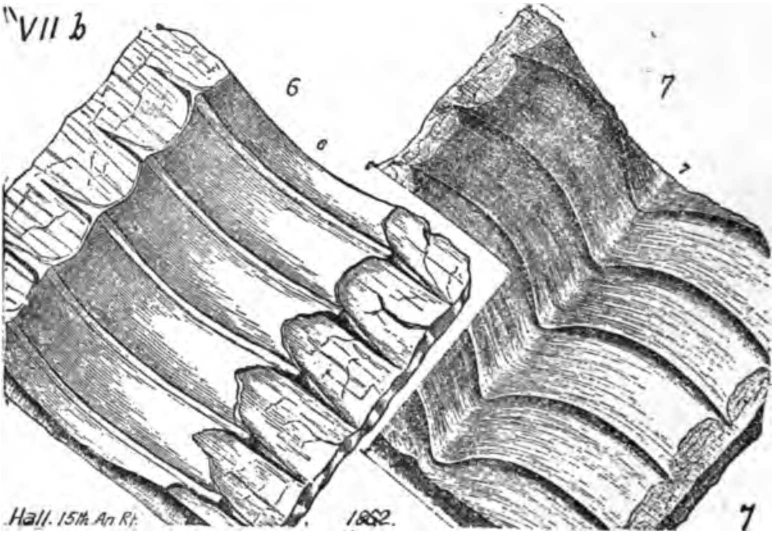


Orthoceras filosum. Clarke, Bull. 16, U. S. G. S. 1885,

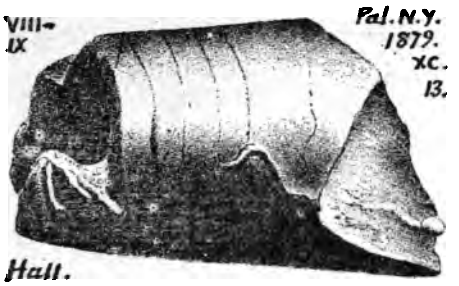


page 52, plate 2, figs. 12, 13, opposites sides; 14, young individual; remarkable sculpturing of surface; very interesting as the only American Devonian representative of the European *Orthoceras socium* group, characteristic of Barrande's Etage E, all of them thin shells, with wavy scale-like ring marks, and no lines lengthways. Specimens from Parrish gully, Naples; from Hatch hill; from Briggs gully, Honeoye lake, N. Y.—*Upper Genesee (Naples) shales. VIII e.*

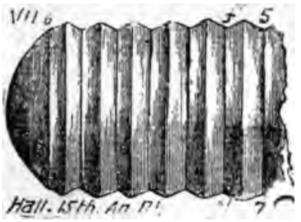
Orthoceras foliatum, Hall. 15th. Annual Report, 1862,



page 74, plate 7, fig. 6, interior, showing lamellose extensions into the surrounding stone; 7, a cast (imprint) showing sinuosity of the plate-like projections on the front side, being generally curved downwards, on the back of the shell, and abruptly bent on the dorsal line. A specimen, of which the shell only is preserved in the stone, is more than 7½ in. long. Fragments and impressions not uncommon in the *Schoharie grit;* but differ from those of *Cyrtoceras eugenium*, in having strong rings nearly up to the aperture, and being perfectly straight (for at least 8 inches.)—*VII b.*

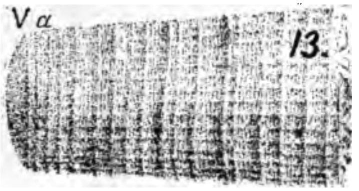


Orthoceras (*Cyrtoceras?*) **hector.** Hall. Pal. N. Y. Vol. V, part 2, 1879, page 364, plate 90, fig. 13 (selected from figs. 11 to 15,) showing curvature and obliquity of suture lines. From *Upper Chemung*, south of Olean, N. Y., that is, in McKean Co. Pa. Compare specimen 883–29, in Howell's coll. at Nichols, Tioga Co., N. Y. (OO, p. 238) from *Chemung*, *VIII g.*



Orthoceras hyas, Hall. 15th Annual Report, 1862, page 75, plate 7, fig. 5. Largest diameter 1 inch, of this unique specimen, found associated with *O. thoas in Schoharie grit. VII b.*

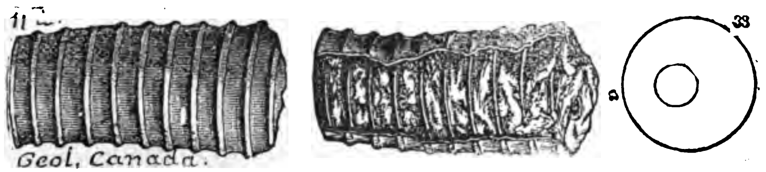
Orthoceras imbricatum. Rogers. page 823, fig. 636. (Sowerby, 1839, Murchison's Silurian system.) In Pennsylvania, found by the First Geological survey in *Clinton strata. V a.*



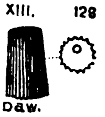
Orthoceras jamesi, Hall and Whitfield, in Newberry's Pal. Ohio, Vol. 2, 1875, page 118 pl. 5, fig. 13, *enlarged three diameters —Clinton, V a.*

Orthoceras læve. See **O. sublæve.** *V c.*

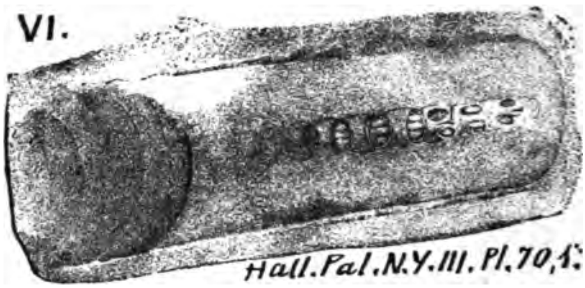
Orthoceras lamarcki, Billings. Geol. Canada, 1863, page 121, figs 38 a. b. c. *Calciferous sandstone. II a.*



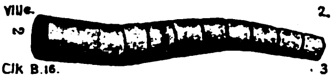
Orthoceras laqueatum, Hartt. Dawson's Acadian Geology, 1868, page 311, fig. 128; with about 26 regular flutings; like *O. gesneri*, De Kon., except for its roundness. smooth flutes. and wider septa spaces ($\frac{1}{8}$ diam.) *Carb. lime.* Windsor. N. S.—*XIII?*



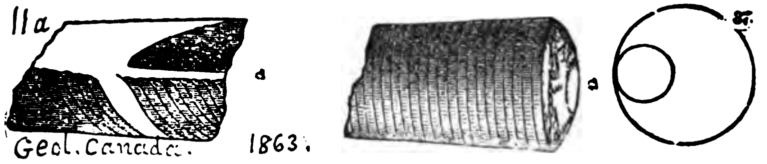
Orthoceras longicameratum. (Hall, 1867, 2' th An. Rt.; Pal. N. Y. Vol. 3, 1859, page 343, plate 70, fig. 1, pl. 71, f. 1 to 5; remarkable for long outer chamber, and high arched septa. Albany and Schoharie Cos. in *Pentemerus limestone* (L. Held.) strata.—In Pennsylvania, Claypole's specimen 6–12 (OOO, 11,801), from Clark's mill, N. W. of New Bloomfield, Perry Co. Pa., upper shales of *Lower Helderberg.* Also doubtfully in Montour Co., at Limeridge quarry, in the upper half of the *Stormville* (*L. Held.*) *limestone.* G7, pp. 101, 261.—*VI.*



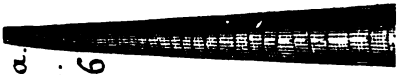
Orthoceras mephisto. Clarke, Bull. 16, U. S. G. S. 1885, p. 29 pl. 3, fig. 2, *magnified twelve times;* minute shell, only $\frac{1}{16}$ to $\frac{1}{8}$ inch long; smooth; body chamber and 8 air chambers; quite the commonest *Orthoceras* found in the nodules (concretions) in the *Genesee black shale* of Ontario Co., N. Y. Suggests the Hamilton *O. exile*, Hall.—*VIII e.*

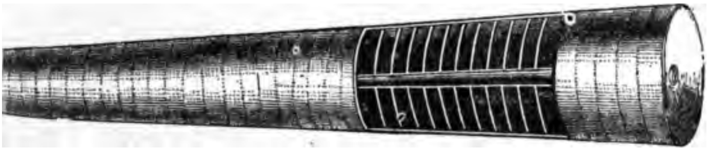


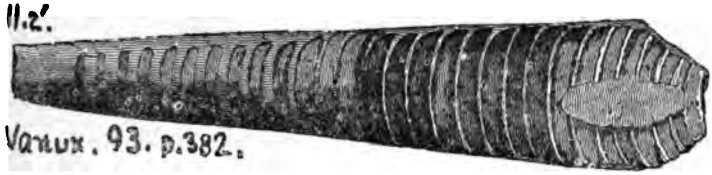
Orthoceras montrealense, Billings. Geol. Canada, 1863, page 121, fig. 37 a, b, c, sections showing the siphuncle. *Calciferous sandstone.* *I. a.*



Orthoceras multicameratum. Rogers, 1858, page 817, fig. 596. Emmons, 1842, page 382, fig. 93. *Birdseye limestone.* Collected by C. E. Hall in *Canoe Valley*, Blair Co, Pa., from

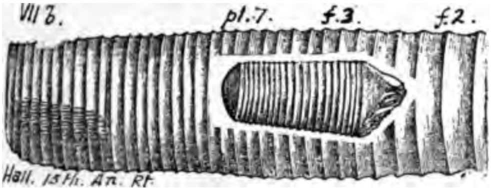






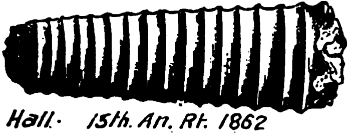
Black river limestone. II c.

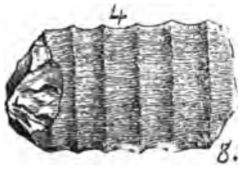
Orthoceras multicinctum, Hall. 15th Annual Report, 1862, page 76, plate 7, figs. 2, 3. Surface ringed with narrow ridges (13 to an inch in one specimen); 15 nearer the point; only 8 nearer the mouth; in another smaller specimen 15 in half an inch.—*Schoharie grit*, *VII b.*


VII b.
pl. 7.
f. 3.
f. 2.
Hall. 15th. An. Rt.

Orthoceras multilineatum. Emmons, Geological Report on the Second District of New York, page 397, fig. 109, 7. *Trenton formation. II c.*

Orthoceras nuntium, Hall. 15th Annual Report, 1862, page 79, plate 8, fig. 3, cast of imperfect specimen; 4, fragment preserving sur-

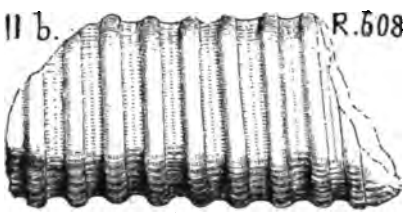




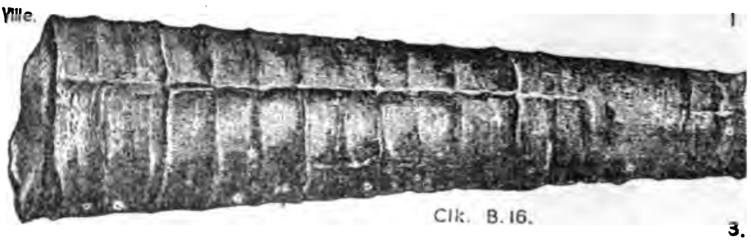
face marking. Sixteen rings to an inch in a specimen less than a half inch thick; 10 in two other cases; 13 in a specimen ¼ inch thick at small end; rings slightly oblique; in one case oblique by the width of a chamber; twice as numerous and sharper than in *O. crotalum.* Closely near *O. ibex*, Sowerby, and *O. articulatum. Hamilton soft shales*, Seneca lake and *coarse shales*, Cayuga lake. *VIII c.*—In Pennsylvania, found as specimen 805–25, of C. E. Hall's Bell's Mills, Blair Co., collections from *Hamilton*, *VIII c.* Also Claypole's Spec. 5–126 (OOO, 11749) from Barnett's Mill, Perry Co., Pa.; 99–4 (12383) from Drumgold's tannery; 233–7 (12837) Roseburg; all three found in *Hamilton upper shales. VIII c.*

Orthoceras ohioense (instead of *O. pelops*, var. *ohioense*,) Hall, Ill. Dev. Foss. 1876, *Up. Held.* (I give one of Hall's figures of *O. pelops*, under that name, below.)—Found in Pennsylvania, OO, p. 235, at Marshall's Falls, Monroe Co. Spec. 801–28, in *Hamilton strata*, *VIII c.*

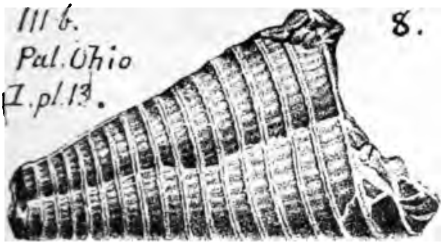
Orthoceras olorus (*Orthoceras vertebrale.*) Rogers, page 819, fig. 608. *Trenton formation.* (Hall, Pal. N. Y. Vol. 1, 1847. "Vertebrale" had been occupied by Schlotheim in 1820, and by Eichwald in 1840.) *II a.*



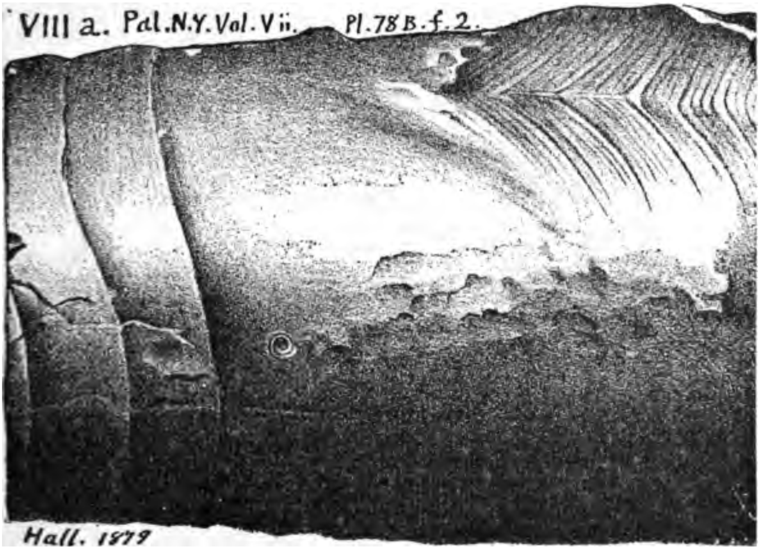
Orthoceras ontario. Clarke, Bull. 16, U. S. G. S. 1885, p. 51, pl. 3, fig. 1, *natural size* (1½ inches of the pointed end cut off;) narrow, low, acute angled, rather distant rings, say 30 in all in 5½ inches, sloping abruptly to surface of shell, leaving flat spaces between. *Naples* (Upper Genesee) *black shales.* Ontario Co., N. Y.—*VIII e'.*



Orthoceras ortoni, Meek, Proc. Acad. N. S. Phila., 1872, Pal. Ohio, Vol. 1, 1873, page 155, plate 13, fig. 8, a side view of an imperfect specimen, somewhat flattened by accidental pressure, in M. Dyer's collection. *Cincinnati group. III b.*

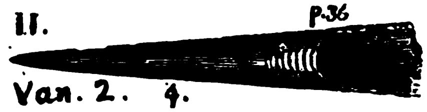

III b.
Pal. Ohio
I. pl. 13.
8.

Orthoceras pelops, Hall. Pal. N. Y. Vol. V ii, 1879, page 233, plate 78 *B*, fig. 2, a portion of Hall's complete figure, showing only the inhabited chamber, and the three narrow chambers behind it, eight others to the smaller end being cut off; also the open end of the large chamber cut off. The scratches (striæ) on one part of the surface are bent to a middle line, not because this is their natural mode of appearance, but the animal thus repaired some violent fracture of its shell, which was thereby thickened and preserved, while all the rest of the shell has been dissolved, leaving only a cast. (Hall; who gives eleven other figures of this species on plates 35, 35 *A*, and 37.) Found at Knox, N. Y. in *Upper Helderberg strata. VIII a.* — *See O. ohioense, above.*

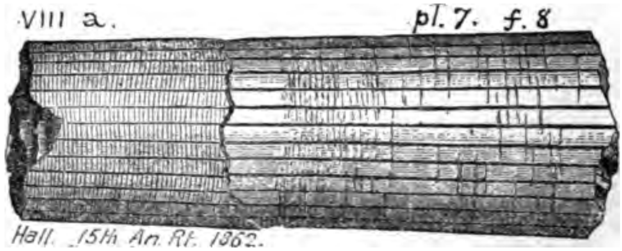

VIII a. Pal. N.Y. Vol. V ii. Pl. 78 B. f. 2.
Hall. 1879

Orthoceras pressum, Rogers, 1858.—Bigsby, Thes. Silur. *Trenton.* Quoted in Report T, page 55.—*II c.*

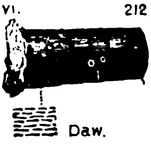
Orthoceras primigenium, Vanuxem. Geol. 3rd. Dist N. Y. 1842, page 36, fig. 2, 4. —Emmons, Geol. 2d Dist. page 179, fig. 53, 4. *Calciferous sand stone. II a.*—Hall, Pal. N. Y., Vol. 1, p. 13, plate 3, figs. 11 and ·11 *a.*—Whitfield, Bulletin Amer. Museum Nat. Hist. N. Y. Vol. 2, No. 2, page 56, plate 10, fig. 1, long section showing septa in lower half; syphon apparently very small and subcentral. Beekmantown, N. Y. *Calc. II a.*



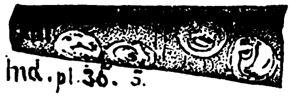
Orthoceras profundum, Hall. 15th Annual Report, 1862, page 76, plate 7, fig. 8, shell marked lengthwise by sharp ridges, one-tenth of an inch apart; and ringed (annulated) by sharp rather distinct striæ, giving the long ridges a wavy look; also often finer striæ of growth; differs from *O. imbricatum* of the *Niagara* in showing no intermediate finer longitudinal striæ; and from *O. virgatum* in more regular arrangement of both long and cross lines. In two individuals of 1½ inch diameter the preserved portion of the outer chamber is 6 inches long. *Upper Helderberg limestone* at Waterville, N. Y.— *VIII a.*


VIII a.
pl. 7. f. 8
Hall 15th An. Rt. 1862.

Orthoceras punctostriatum, Hall. Dawson's Acadian Geology, 1868, page 605, fig. 212; section circular, siphuncle central; surface very finely striated with unequal wavy striæ, between which are oblong indentations, often running into each other. A shell remarkable for its extremely slight

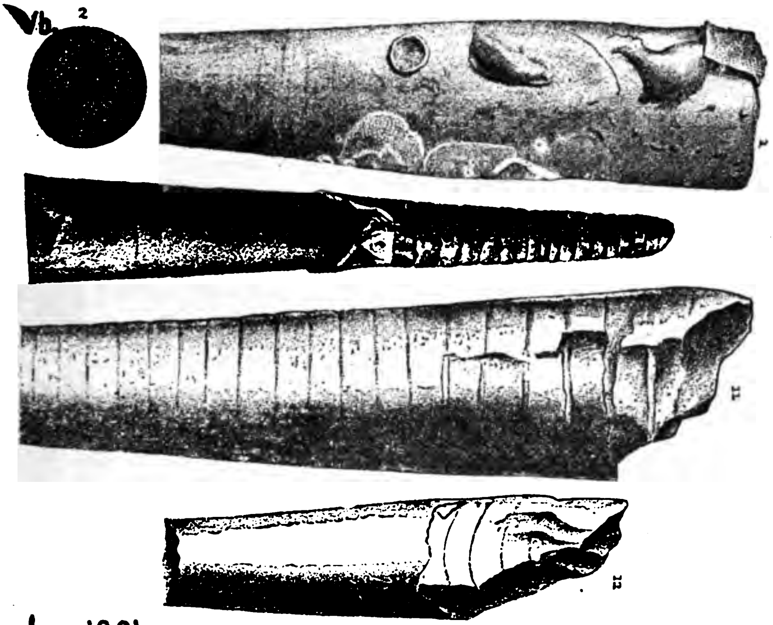


taper, a fragment an inch long showing scarcely a perceptible narrowing; 12½ chambers in an inch of length. Large specimens (2″ in diam.) show the peculiar characteristic punctation. Arisaig, N. Scotia.—*V?*



Orthoceras rushense. (McChesney, New Pal. Foss. Coal Measures, 1860.) Collett's Indiana Report 1883, page 164, plate 36, fig. 5, *natural size*, side view of fragment. Attached to it are four valves of *Crania modesta*—Lived from coal A to the top of the Coal Measures in Indiana; but there are probably three or four species of small *Orthocerata* in the Coal Measures so much alike that they are mistaken for each other. Collett. It is more reasonable to suppose individual peculiarities.—Recognized by J. J. Stevenson (K3, p. 310) in the Coal Measures of southwest Pennsylvania.—*XIII.*

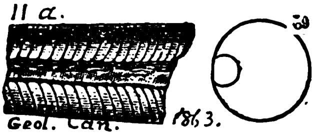
Orthoceras simulator, Hall. Doc. Edit. 28th Rep. State Museum of Natural History, plate 28, fig. 11, 12, 1878. Mus. edit. p. 179, 1879.—Figures above from Collett's Indiana Re-



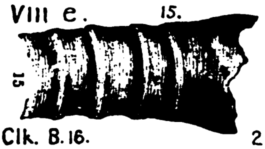
IND. 1881. PL. 33.

port of 1881, page 322, plate 28, figs. 11, 12, and plate 33, figs. 1, 2. Specimens frequently flattened and shell destroyed; septa usually obliterated. *Niagara formation. V b.*

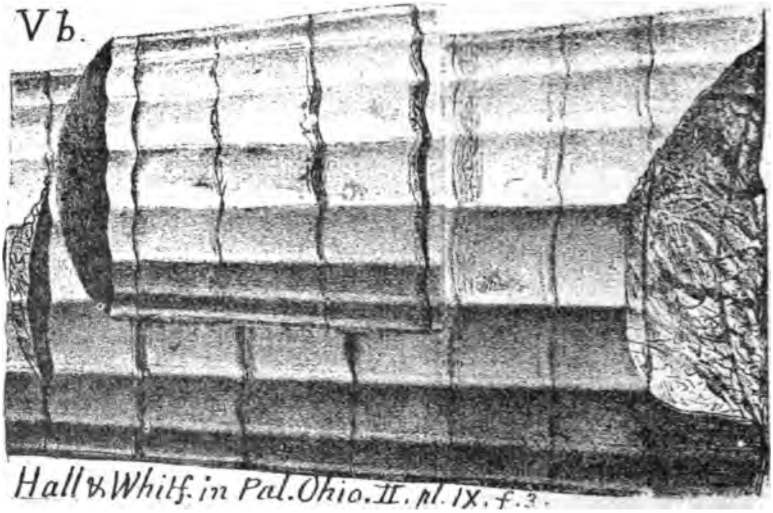
Orthoceras sordidum, Billings. Geology of Canada, 1863, page 121, fig. 39. *Calciferous sandstone (Lower Silurian) formation. II a.*



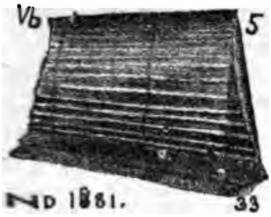
Orthoceras stebos. Clarke, Bull. 16, U. S. G. S. 1885, page 29, plate 2, fig, 15, *magnified 12 times*, a unique specimen, from the Genessee shale of Ontario Co., N. Y.—*VIII e.*



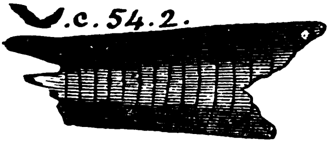
Orthoceras strix, H. & W. Pal. Ohio, Vol. 2, 1875, p. 149, plate 9, fig. 3, internal cast of type specimen (the figure in Pal. Ohio, being 8 inches long, has been cut and only the two ends used); transverse section broadly oval, or subcircular (partially compressed, as shown by cylindrical small end); flutings striated (?) lengthwise, but no trace of cross-striation noticeable. Much like *O. columnare*, Hall, but with much larger flutes, and tapers faster. Differs still more from *O. cadmus*, Billings, Sil. Foss. Anticosti. *Niagara limestone* at Yellow Springs, O.—*V b.*



Orthoceras subcancellatum, Hall, in Collett's Indiana Report of 1881, page 323, plate 33, fig. 5. (*O. cancellatum*, Hall, Pal. N. Y. Vol. 2, page 292; not *O. cancellatum* of Eichwald, 1842.) Surface ornamented with angular ridges lengthwise, between which run finer striæ, crossed by finer equal striæ, which gives the cancellated appearance. Rare at Waldron, Ind., and then only as inside casts preserving only the long ridges and lines. *Niagara strata. Vb.*



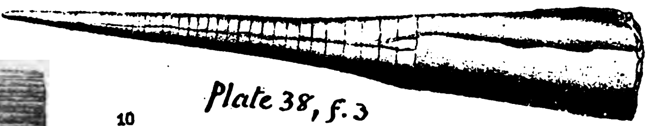
Orthoceras sublæve. (*Orthoceras læve.*) Hall, Geology of the Fourth or Western District of New York, page 137, fig. 54. 2. *Clinton formation. O. læve* preoccupied by Fleming, in 1825.) *Va.*

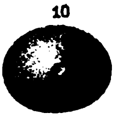


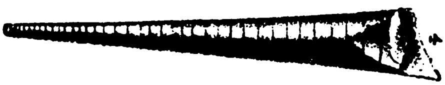
Orthoceras subulatum. Hall, Geol. Fourth District, N. Y. page 180, fig. 71, 1, Rogers, page 826, fig. 654. *Marcellus formation. VIII b.*

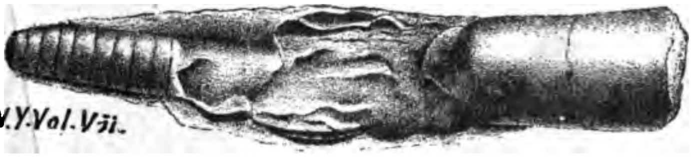
VIII.b.
Hall.71.1.

Orthoceras subulatum, Hall, 4th Dist. N. Y. 1843; Pal. N.



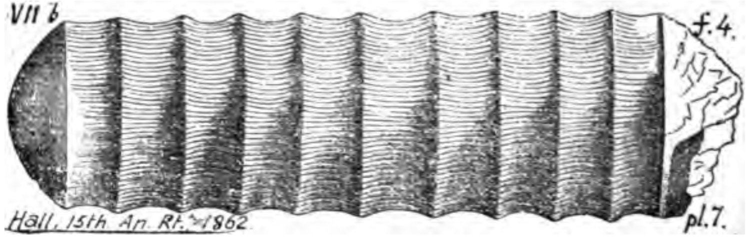






Y. Vol. V ii, 1879, page 283, plate 38, f. 3, the original type, pl. 84, 1, 4, 9, 10. *Marcellus* and *Hamilton.*—Found by I. C. White in Hemlock township, Columbia Co. Pa., G7, 76, 230, near top of *Marcellus.* Also in *Marcellus limestone* at Huntingdon (T3, 115); in *Hamilton lower shales*, Coffee run railroad quarry (p. 112); in top beds of *Genesee*, Piney ridge, McConnellstown (p. 108 and OOO spec. 12736). Also at Bloomsburg, Columbia Co. (Spec. 12293) from *Hamilton strata.*—Also at Dorran's narrows, Perry Co. (specimen 12549) from *Hamilton upper shale.*— *VIII b, c, e.*

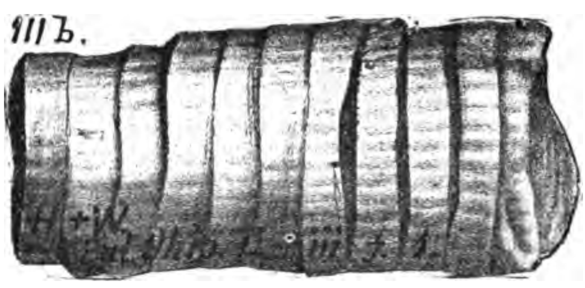
Orthoceras thoas, Hall. 15th Annual Report, 1862, page 75, plate 7, fig. 4. Nearly all specimens are a little flattened by rock pressure. Rings in two specimens 8 and 9 in the same length. Siphuncle of one an inch thick is a little over three-twentieths of an inch wide. Ring ridges are *direct*, thus differing from the *Niagara* species; as also in having striæ lengthwise. It tapers less than the ringed *Hamilton* species. —*Schoharie grit*, East N. Y. *VII b.* — In Pennsylvania, found at Dingman's Falls, Pike Co. Spec. 808–18 (small fragment) "from *Hamilton strata,*" *VIII c.* [possibly from a lower outcrop and mislabelled.]



Orthoceras trentonense. See **Cyrtoceras trentonense.** *II c.*

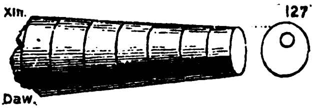
Orthoceras vertebrale. See **Orthoceras olorus.** *II c.*

Orthoceras turbidum, H. & W. Pal. Ohio, Vol. 3, 1875 page 100, plate 3, fig. 1, side view of unique and therefore type specimen, in Mr. James' Coll, at Cincinnati from the *Hud-*



son River shales; showing remains of the low rounded ridges which traverse its surface lenhtgwise, nine or ten to one inch of circumference; chambers displaced and distorted by pressure; but surface show entirely different from other *Orthocerata* of this formation. *III b.*

Orthoceras vindobonense, Dawson. Acadian Geology, 1868, page 311, fig. 127; septa distant about ½ diameter; resembles *O. laterale*, Phil. of England, but smaller, more cylindrical, and septa farther apart. *Carb. lime.* at Windsor, N. S.—*XIII?*


XIII.
127
Daw.

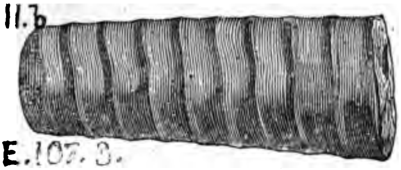
Orthoceras ——— ? Two fragments found in the *Potsdam sandstone* of Canada. Geol. Canada, 1863, page 102, fig. 10, from Beverley; fig. 11 from South Crosby.—*I.*

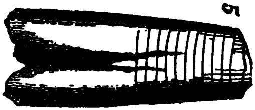
I.
10
11
Geol. Can.

Orthoceras ——— ? Geol. Canada, 1863, page 121, fig. 36, the cast of the internal cavity (siphuncle) of an *Orthoceras* of *Calciferous sandstone age. II a.*

II a
36.
Geol. Canada.

Orthocerata figured by Emmons in his Geol. First Dist. N. Y., 1842, p. 396, 397, figs. 107, 3; 109, 5, 6; all from the *Trenton.*—In Pennsylvania, Mifflin Co. Kishicoquillis Valley. See Hall & Hale's OOO Spec. 201–5 (interior) from Reedsville; Spec. 203–36 (incrusted with *Paleschara*) from Bellefonte; Spec. 204–27 (possibly a crusted *Endoceras*) from Reedsville, all from the top *Chazy*, or bottom *Trenton beds.*—A *Trenton Orthoceras* from Chambersburg, Franklin Co. (Cat. O, Spec. 3776.) *II c.*—


II.b
107.
E.107.3.


II.b.
5
E.109.5.p.397.

II.b
E 109.6.p.397

See C. E. Hall's *Orthoceratite* fragment, found in boulder, Lehigh Co. D2, p. 22.

Orthoceras —— ? Centre Co., Ewing, T4, 427, in *Hudson river* beds. *III b.*

Orthoceras —— ? Perry Co., Claypole's Spec. 12132, at Waggoner's mill, *Clinton* or *Salina. Va c.*

Orthoceras —— ? C. E. Hall's Coll. from *Marcellus* & *Hamilton.* Ms. Rt. Dec. 30, 1876. *VIII b, c.*—OOO, specimens 805 26, Bell's Mills, Blair Co.; 808-16, Dingman's Falls, Pike Co. are small fragments from *Hamilton strata. VIII c.*

Orthoceras ——— ? a large species, found by Claypole (Spec. 12,354) at Crawley hill, Perry Co. in the *Hamilton fossil ore;* (12,785) I. C. White at Huntingdon, and (11,632) Claypole at Camp's mill; both from *Hamilton upper shale.*

Orthoceras ——— ? one single specimen of small size was found by I. C. White (T3, 183, 185) in bed 7 of the Patterson section, Huntingdon Co. *Lackawaxen* (or *Upper Chemung*) *conglomerate. VIII g.*—See Sherwood's Tioga Co., Pa., Lawrenceville specimen 850-24 (poor interior); Howell's Tioga Co. N. T. Nichols specimens 883-21 (outer chamber); 883-29, 30 (poor, fragment); Hicks' McKean Co. Kane specimen 880 2 (small fragment). Around Bradford *Orthoceras* with *Spirifera disjuncta* was found in gray calcareous sandstone surface fragments (Spec. O 3388, 3389, 3391). On Wilcox hill, W. of depot, Spec. 3285, *Orthoceras* with *Strophomena* and *Pterinea* in sandstone. In Warren Co. around Warren Spec. 3281, *Orthoceras, Sp. disj.* and crinoids in sandstone. Here an *Orthoceras, one and a quarter inches in diameter* is reported by Carll, Rt. *IIII*, p. 318 '9.—All the above are from high *Chemung* or *Chemung-Catskill strata. VIII-IX.*

Orthoceras ——— ? abundant in and characteristic of the *Third Oil Sand*, or *LeBœuf* (*Panama*) *conglomerate* quarries of Erie Co., Pa. Q4, pp. 110, 299.—*VIII-IX ?*

Orthoceras ——— ? a small species abundant in the blue shale under the *Cussewago sandstone* in Crawford Co. at the canal feeder, Hayfield ravine, Q4, pp. 97, 201.—*X.*

Orthoceras ——— ? a large species in the *Third Mountain Sand* (*Pithole, Berea ? grit*) in Warren and Mercer Cos. Carll's IIII, 273; White's Q3, 158.—*X.*

Orthocerata, mostly undescribed species of western *Kinderhook limestone* aspect, (I. C. White, Q4, 83) abound in the *Meadville upper limestone*, Crawford Co.—*X*.

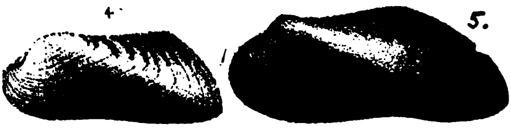
Orthoceras ——— ? in loose piece of brown sandstone, Spec. 2797, Ennis hill, Pleasantville, Venango Co.—*X*.

Orthoceras ——— ? Stevenson's K3, 311, in Fayette and Westmoreland Cos. *Lower Carboniferous*. *XIII?*

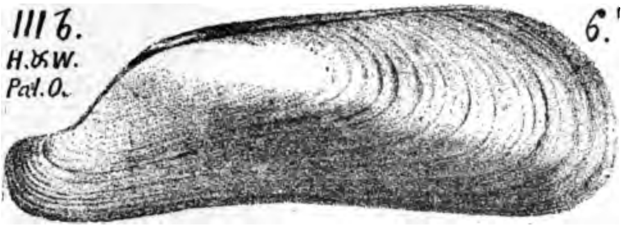
Orthoceras ——— ? small species, plentiful in *Black Foss. limestone* (Barren Measures) Stevenson, Trans. A. P. S. XV, p. 26; L, p. 21. Also in Indiana Co. H3, p. 239.—*XIV*.

Orthoceras ——— ? several ill-defined casts and impressions, found by Heilprin among the Mill Creek Limestone fossil collection of Wyoming Hist. Soc. Wilkes-Barre, Pa. Geol. Sur. An Rt. 1885, p. 457, 1000′ above Pottsville Conglomerate. *XIV*.

Orthoceratites. See **Orthoceras.**

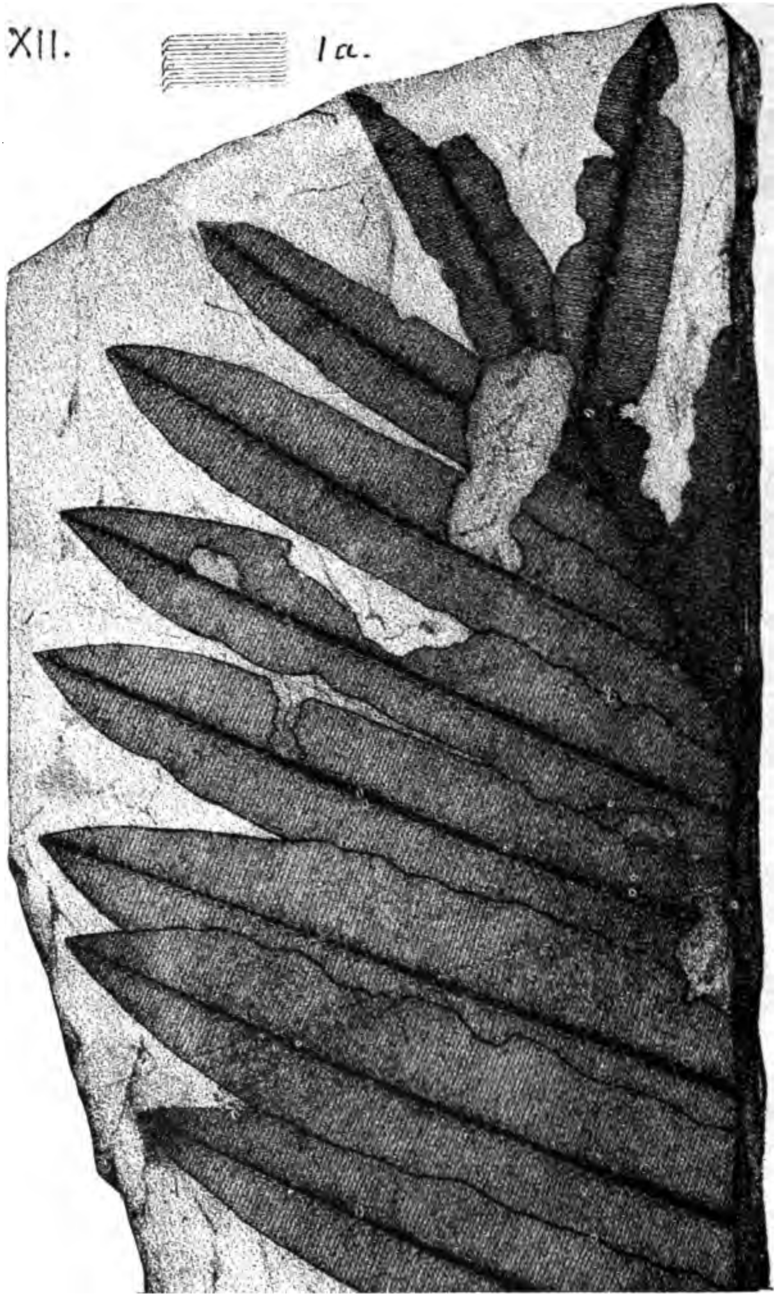


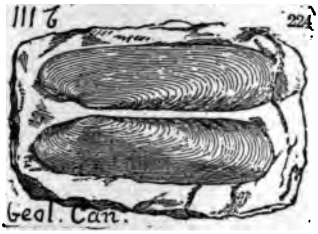
Orthodesma contractum, Hall. (*Orthonata contracta* Hall.) Pal. N. Y., Vol. 1, 1847.—Pal. Ohio, Vol. 2, 1875, page 96, plate 2, fig. 4, left side of typical specimen, showing folds of hinge slope; 5, another specimen, different, from near Waynesville, O.—*Cincinnati group*, *III*.

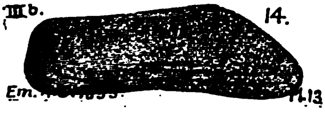

III b.
H.&W.
Pal.O.
6.

Orthodesma curvatum, H. & W. Pal. Ohio, Vol. 2, 1875, page 95, plate 2, fig. 6, left side, showing general features of a specimen from near Waynesville, O. Shape characteristic. Front muscular scar strong, medium size, very near front end; hind scar not observable. Surface marked by many concentric wrinkles, and by finer irregular growth-lines. At first suppsed to be *Modiolopsis nasuta*, Hall, of *III b* in N. Y.; but hind end three times as long in proportion, etc.—*III b*.

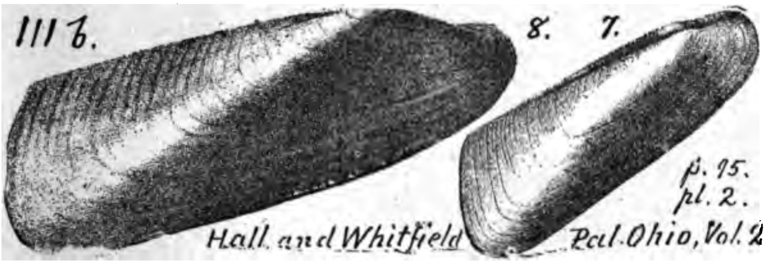
Orthogoniopteris clara. *See page 565.*







Orthodesma parallelum. (*Orthonota parallela.* Hall, Pal. N.Y. Vol. 1, 1847, Hudson River group.) Emmons, Am. Geol. I ii, 1855, 173, plate 13, fig. 14; with an obscure keel; fine concentric striæ, and a few strong wrinkles along the back ridge. I add from Geol. Canada, 1863, page 216, fig. 224. —*Hudson River* (*Loraine*) *formation. III b.*

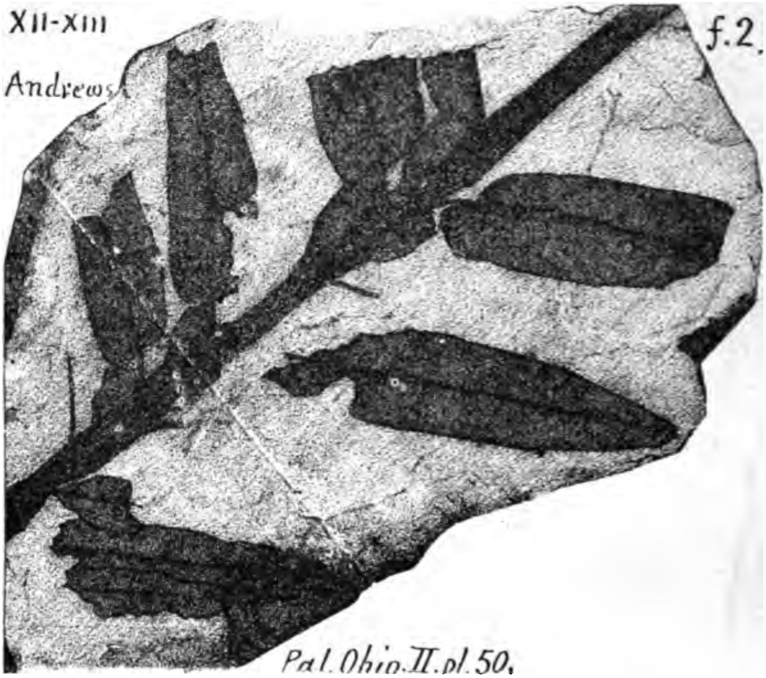


Orthodesma rectum, H. & W. Pal. Ohio, Vol. 2. 1875, page 95, plate 2, fig. 7, right side of a small specimen; fig. 8, a larger individual, characteristic; found, with other species of *Orthodesma*, at Waynesville, O., in upper soft *Hudson River shales.* Not readily mistaken except perhaps for *O. curvatum*, which however has a contracted base line, and is broader behind. Is somewhat like *O.* (*Orthonota*) *parallelum* of the N. Y. Hud. Riv. formation, which however has a rounded hind end, etc.—*III b.*

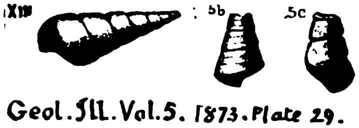
Orthogoniopteris clara, Andrews. Pal. Ohio, Vol. 2, page 419, plate 50, fig. 1, *nat. size* of the plant; but the fig. does not show the rounding of the base of the upper side of the leaves, which feature is dimly seen in the specimen; 1 *a*, *enlarged* nervation. *Coal measures. XIII? — For the figure of this plant see page 564.*

Orthogoniopteris gilberti, Andrews. Pal. Ohio, Vol. 2, 1875, page 420, plate 50, fig. 2, *naturalsize*, a plant species of the bottom strata of the *coal measures*, which shows the upper basal margin of the leaves.—*XII-XIII.—For the figure of this plant see page 566.*

Orthogoniopteris gilberti, *continued.*

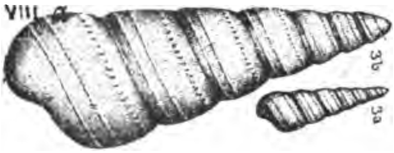


Orthonema (*Michelia*) **conicum**, Meek and Worthen, Proc. Acad. Nat. Sci. Phil. 1866, Geo. Sur., Ill., vol. 5, 1873, page 590, plate 29, figs. 5*a*, *nat. size*; *b*, in which lower turns project a little just above the suture. with faint traces of two ridges above angle of lower whorl; *c*, another, plainer case. (*b* and *c* may be of another species.) Macoupin Co., Ill. Lower part of *coal measures*. *XIII*.



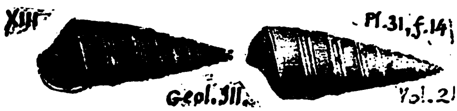
Geol. Ill. Vol. 5. 1873. Plate 29.

Orthonema newberryi, Meek, Proc. Acad. Nat. Sci., Phila., 1871.—Pal. Ohio, Vol. 1, page 217, plate 20, fig. 3*a* ***natural size***, dorsal side; 3*b*, same *magnified* to show markings. *corniferous limestone*, *VIIIa*.

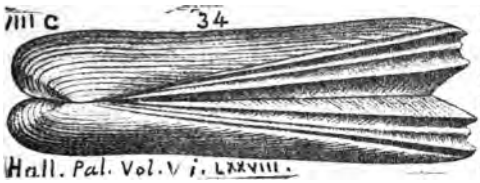


Orthonema obsoleta. Meek, Proc. Acad. Nat Sci., Philadelphia. 1871. Pal. Ohio, Vol. 1, page 218, plate 19, fig. 6*a*, *b*.

Orthonema salteri, (*Eunema? salteri.*) Meek and Worthen, Proc. Acad. Nat. Sci. Phil. 1860.—Geo. Sur. Ill., Vol. 2, 1866, page 381, plate 31, figs. 14*a*, 14*b*. *enlarged. Lower coal measures. XIII.*

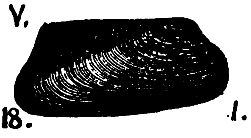


Orthonota carinata, Conrad, An. Rt. of N. Y. 1841, *Hamilton*. Hall, Pal., N. Y., Vol. 5, pt. 1, plate 78, fig. 34, *enlarged twice.*—In Pennsylvania, see Claypole's spec. 11665 (5–20) Perry county, Barnett's mill, *Hamilton upper shale. VIII c.*


VIII c
34
Hall. Pal. Vol. V. i. LXXVIII.

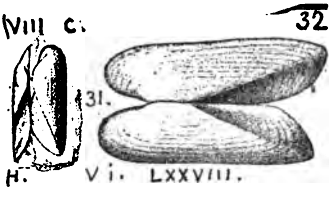
Orthonota contracta. See **Orthodesma contractum.** *III b.*

Orthonota curta. Hall. Western District of New York, 1843, page 76, fig. 18, 1; also Pal. N. Y., Vol. 2, plate 27. (*Orthodesma curtum.*) *Clinton* and *Niagara* formations.—Found in specimen 508–15, Orbisonia, Huntingdon Co. Pa. from *Clinton shale*, *V a.*

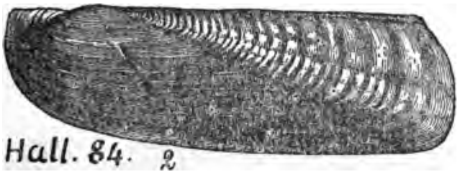


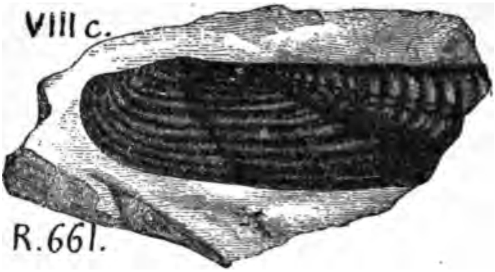
Orthonota parallela. See **Orthodesma parallela.** *III b.*

Orthonota parvula, Hall. Preliminary notice of Lamellebranchs, 1870; Pal. N. Y. Vol. 5, part 1, plate 78, fig. 31, *enlarged twice*; 32, *natural size. Hamilton.*—In Pennsylvania, Claypole's specimen 12564 (142–8) from Montebello Narrows, Perry Co., in *Hamilton upper shale*, *VIII c.*


VIII c.
32
31.
H. V i. LXXVIII.

Orthonota undulata, Hull, Fourth Dist., 1843, page 205, fig. 84, 2, *Hamilton*,—Vanuxem, 1842, page 150, fig. 36, 2. *Marcellus.*—Rogers, page 827, fig. 661. *VIII.*—(Conrad, Ann. Rt. N. Y., 1841, Hamilton formation.)—





In Columbia Co., Pa., in bed 3 of Fishing Creek section at *top* of *Hamilton* (G7, 219.)—In Perry Co., Barnett's mill, spec. 11732 (5–103) *Hamilton proper.*—In Huntingdon Co., at Huntingdon; and in bed 22 of the Patterson section, in *Hamilton upper shale.* (T3, 109, 186); at Rough and Ready, and on Crooked creek, in *Hamilton sandstone* (T3, 110, 211); at Grafton, spec. 12858 (243–2) in *Hamilton, VIII c.*—Ewing finds it in Center Co., (T4, 433,) in *Marcellus.* *VIII b.*

Orthonota——— ? Ewing, in Report on Centre Co., T4, p. 427; in *Hudson river shale, III b.*

Orthonota——— ? found by Heilprin among the collections of the Wyoming Historical Society at Wilkes-Barre, Pa., obtained from the Anthracite measures in that Northern Anthracite coal field. See Geol. Sur. Pa. Annual Report for 1885, page plate 446, fig. 17.—*XIII.*

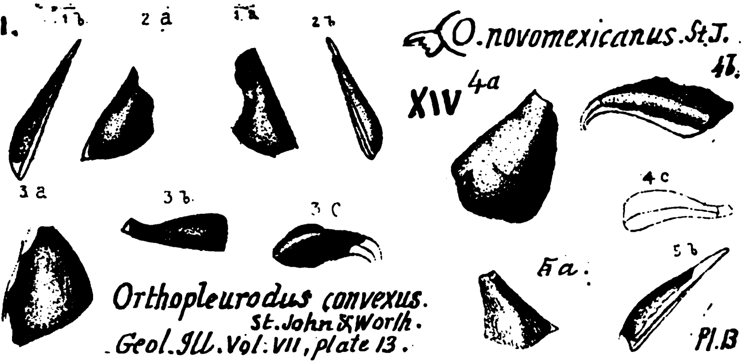
Orthonychia conica. See **Platyceras conica.** *VIII–IX*

Orthonychia lodiensis. See **Platyceras lodiense.** *X.*

8 a
N.and W.
Geol. Ill.

Orthopleurodus carbonarius. (*Deltodus angularis*) Newberry and Worthen. Geo. Sur. Ill., Vol.2, 1866, page 97, plate 9, figs 1, (*Deltodus angularis,*) back tooth of the fish, seen from above. La Salle, Ill., *coal measures.*—Vol. 7, 1883, page 192, (*Sandalodus carbonarius*) fig. 6*a*, back jaw tooth in left jaw, *seen from above* and well preserved, but small; 6*b*, back mandible tooth, left jaw, ditto; 6*c*, middle mandible, ditto. All three found together in a spec. of roof shale of coal 5, Bloomington, Ill.—*XIII.*

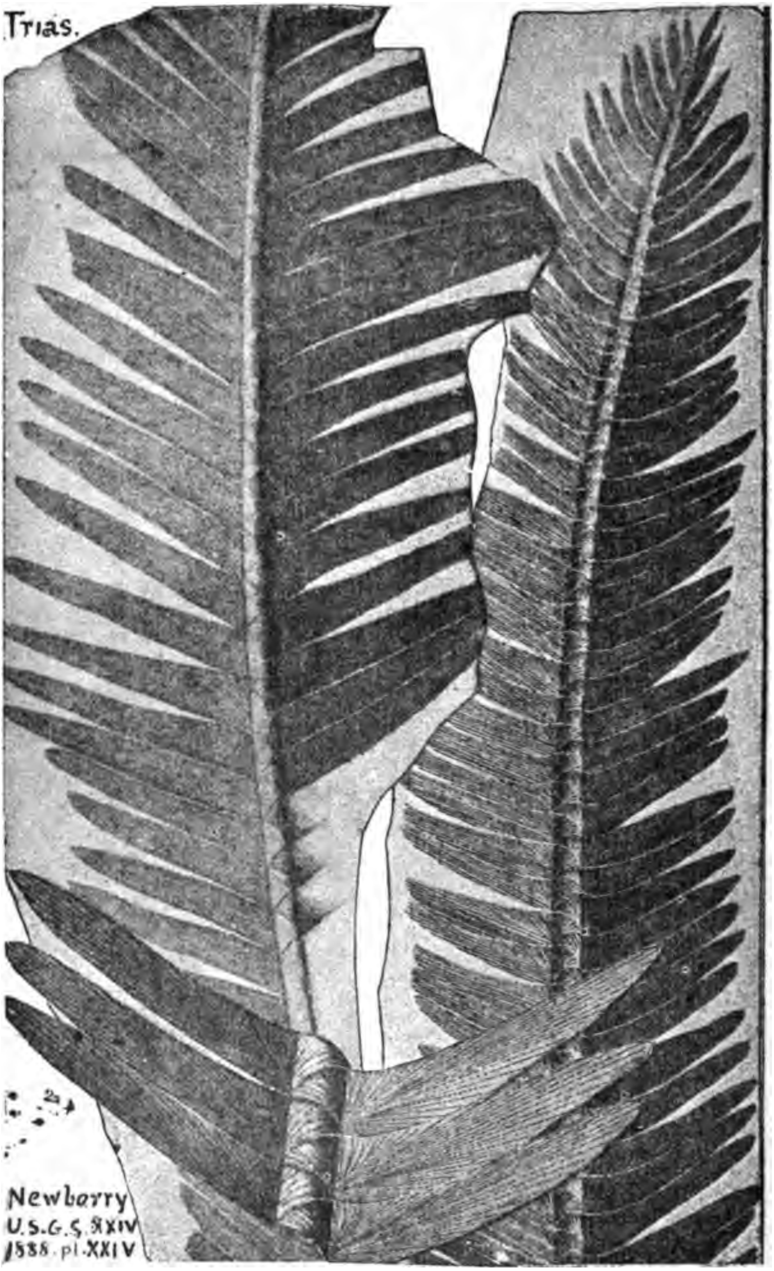
Orthopleurodus convexus, St. John and Worthen, Geo. Sur., Ill., vol. 7, 1883, page 193, plate 13, figs. 4*a*, *b*, *c*. upper back tooth of the right jaw of the fish, from above and sidewise, and section; 5 *a*, *b*, lower back tooth. Found by Worthen in the *Barren measures* (above the Mahoning sandstone), at Morgantown, W. Va., and certain to be found in Pennsylvania. *XV.*



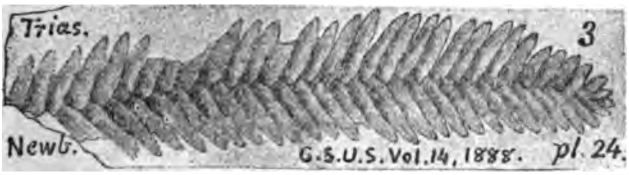
Orthopleurodus novo-mexicanus. (*Figures with those of O. convexus.*) St. John and Worthen, Geo. Sur., Ill., vol. 7, 1883, page 195, plate 13, figs. 1*a*, lower back tooth of the fish, seen from above; 2*a*, *b*, similar views of the same form; 3*a*, *b*, *c*, upper back tooth; seen from above; inner margin; profile of frontside edge. Santa Fe; *Lower carboniferous.* *X? XIII?*

Ostracoids. (*See* **Crustaceans.**)—K, 242, 243.—Undetermined species in the coal measures of Fayette, Westmoreland, etc., K3, 310.—Abundant in the poor limestone beds of the *Great Limestone* (*Monongahela series*) near Manor station, P. R. R. K3, 307; K2, 346.—Abound (*Estheria, etc.*) in roof shales of *Washington lower and upper limestones*, with fish teeth and scales. K3, 306.—Abound (*Cypris, etc.*) in the still higher limestones of the *Upper Barren Coal Measures*; in some of them quite unaccompanied by other fossil forms. K3, 306.—*XV, XVI, XVII.*

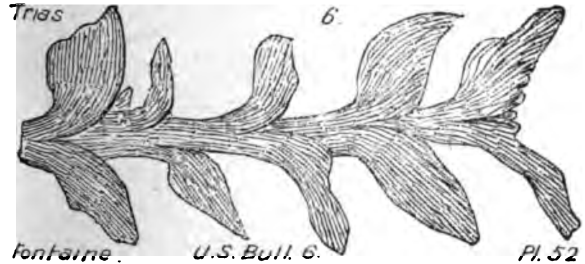
Otozamites latior. *See page 571.*



Otozamites brevifolius, Fr. Brogniart, Newberry's Monograph on Triassic plants and fishes in the U. S. G. Survey, Vol. 14, 1888, page 91, plate 24, fig. 3, from Durham, Conn., brown sandstone quarries.—*Trias.*



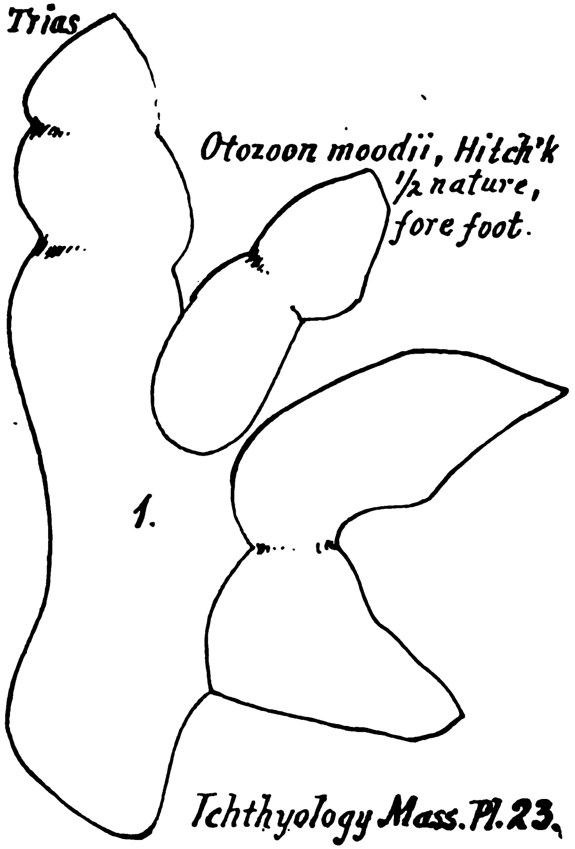
Otozamites caroliniensis, (*Albertia latifolia*, Emmons, Amer. Geol. page 126, fig. 95.) Fontaine, U. S Geolog. Survey, Bulletin No. 6, page 117, plate 52, fig. 6. Separate leaves not uncommon in the North Carolina *Lockville blue clay*, base of *Upper Mesozoic. Trias.*



Otozamites latior, Saporta. Newberry's Mon. on Trias fishes and plants, in U. S. G. Survey, Vol. 14, page 90, plate 24 fig. 1, *natural size*, base, and fig. 2, summit of frond, found at Durham, Conn., fig. 2 *a*, *enlarged* to show nervation.—*For figure see page 570.—Trias.*

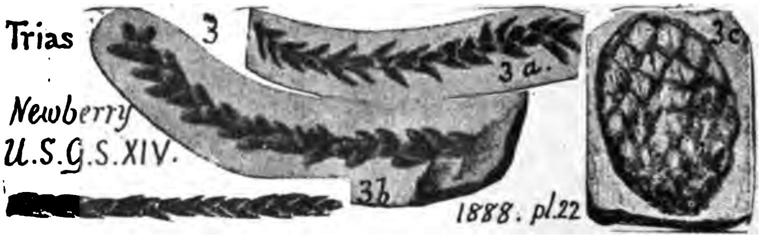
Otozoon moodii, E. Hitchcock. Ichthyology of Massachusetts, pl. 23, fig. 1, *reduced* from original published figure to *one-half.* Found in the Connecticut river sandstone quarries. NOTE. Dr. E. Hitchcock put **Otozoum,** with *Batrachoides*, *Palamopus*, *Macropterna*, *Cheirotheroides*, *Shepardia*, *Lagunculapes*, *Selenichnus*, *Hoplichnus*, and *Saltator*, in his sixth group, "Batrachians." (Frogs.)—*Trias.—See p. 572.*

Otozoum parvum, n. sp. E. H. Hitchcock. Fig. 1, hind foot track; fig. 2, fore foot track (both *natural size*); fig. 3, reduction of the two foot prints to show in what relation they stand to each other on the slab of *Trias* sandstone in the quarries at Milford, on the New Jersey side of the Delaware river, about thirty miles above Trenton. Discovered and traced in

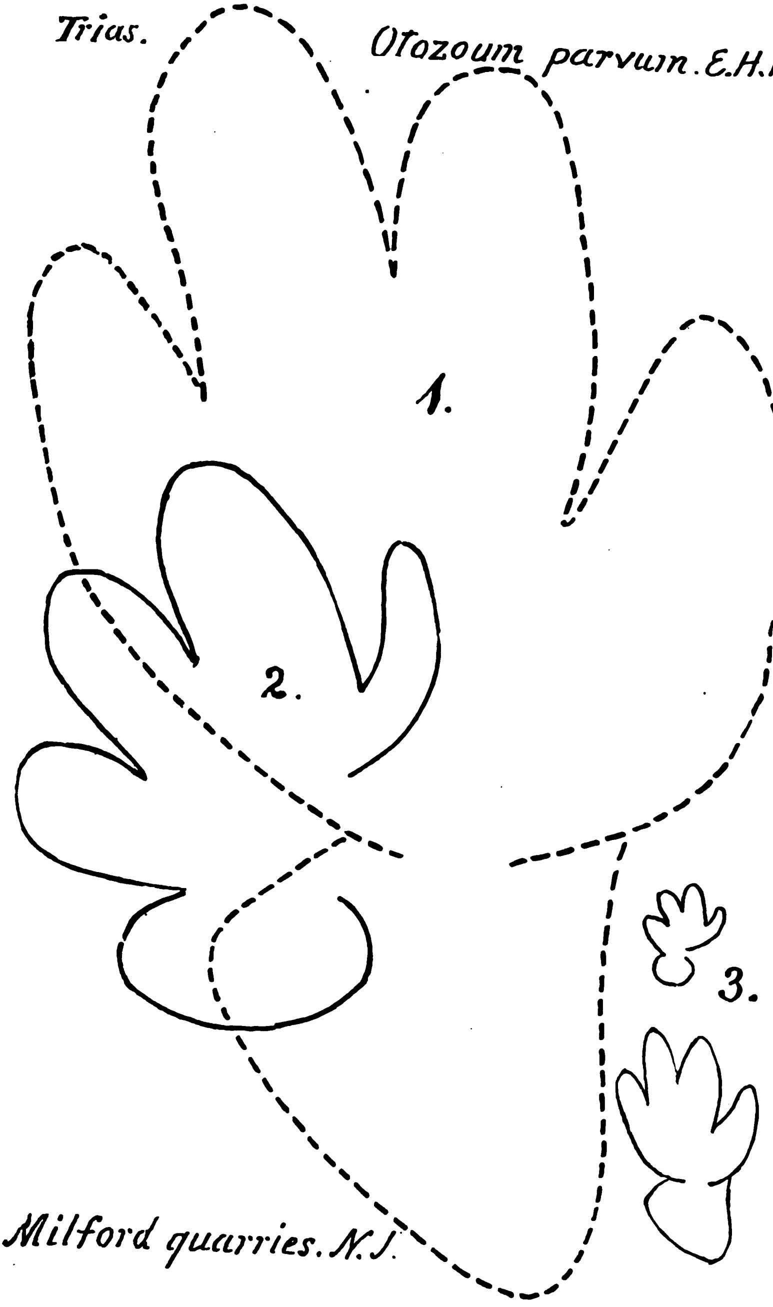


(**Otozoum parvum**, *continued.*)
outline by Prof. E. H. Hitchcock. (See MS. letter, Dec. 1888.) *Upper Trias.*—Note. When first seen it was thought to be a *Cheirotherium* track, but it has only four toe marks on each foot. *For figure see page 573.*

Pachyphyllum brevifolium, Newberry Monograph of



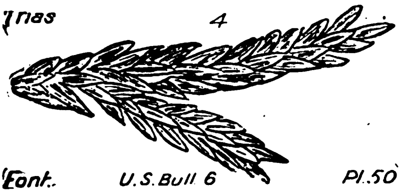
Trias. *Otozoum parvum. E.H.H.*



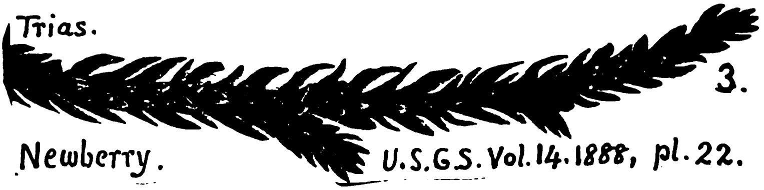
Milford quarries. N.J.

Trias fishes and plants, U. S. Geol. Survey, Vol. 14. 1888, p. 89, pl. 22, fig. 3, 3 *a*, twig with divergent leaves; 3 *b*, another with appressed leaves; 3 *c*, cone.—*Trias.*

Pacnyphyllum peregrinum, Lindley & Hutton. (*Walchia variabilis*, Emmons, Amer. Geol. fig. 76.) Fontaine's Monograph, U. S. Geol. Sur. Vol. 6, 1883, p. 108, pl. 50, fig. 4. Certainly the English *Lower Liassic* plant; and the *Araucaria peregrina*, L. & H. Foss. Fl. of G. B. pl. 88. Emmons says its horizon is 500′ above the horizon of the most common North Carolina *Mesozoic* cycads.—*Trias?*

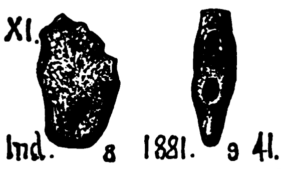


Pachyphyllum simile, Newberry. Monograph of Triassic fossil fishes and plants, in U. S. G. Survey, Vol. 14, 1888, p. 88, pl. 22, fig. 2; quarry at Sunderland, Mass.—*Trias.*

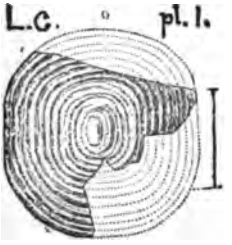


Pagura quadraspinosa. See **Bathynotus holopyga.** *L. C.*

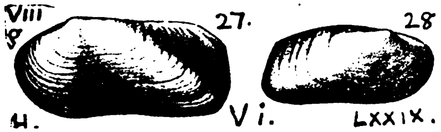
Palæacis cuneatus, (*Sphenopoterium cuneatum* Meek & Worthen, 1860, Proc. Nat. Acad. Sci. Phil. St. Louis limestone; Geol. Sur. Illinois, Vol. 2, p. 263, pl. 19, fig. 1 a, b, c, d.) Collett, 1881, page 369, plate 41, fig. 8, side view, *ordinary size*, 9, edge view, *natural size.*— *Warsaw limestone. XI.*



Palæacmea? acadica. (*Discina acadica*, Hartt, Dawson's Acad. Geol. 2d, Ed. 644, fig. 222.) Walcott Bull. 10, U. S. G. S., page 19, plate 1, fig. 6, type specimen, *enlarged twice.*—*Lower Cambrian* (*Saint John*) *formation. L. C.*

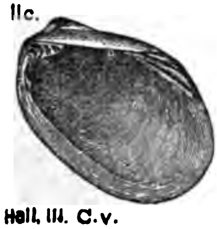


Palæanatina typa, Hall. Pal. N. Y. Vol. 5, part 1, plate 79, fig. 27, left valve of ordinary form; 28, right valve of a depressed specimen. *Chemung.*—NOTE In MS. corrections of a copy of Prelim. Notice Lamell. 1870, recd. Feb., 1889, Prof. Hall compares this with *Cypricardites contractus*, on page 178.—*VIII g.*

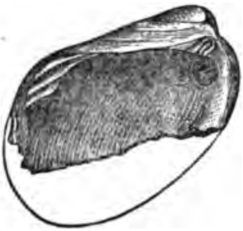


Palæarca saffordi. See **Cypricardites saffordi.** *VI.*

Palæarca ventricosa (now **Cypricardites ventricosus.**) Hall, Pal. N. Y. Vol. 3, p. 271, 1, 2, 3, Trenton in Tennessee. —*II c.*



1.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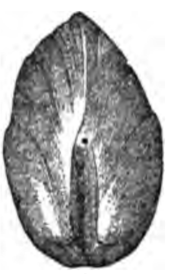
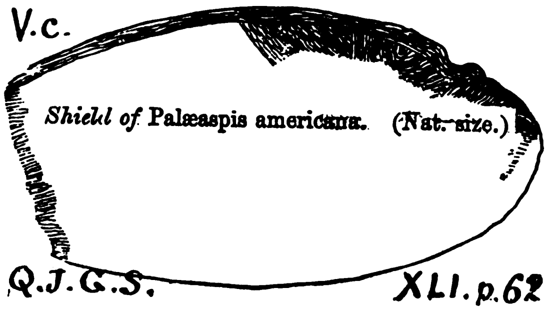
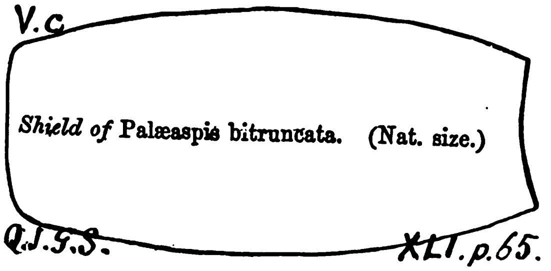

3

Palæaspis americana. Claypole, Preface to Report F2. Geol. Survey of Penn., 1888, page xii. (Q. J. London Geol. Soc. Vol. XLI, p. 62.) Perry Co., Pennsylvania. *New Bloomfield sandstone* top of *Salina.* *Vc.*

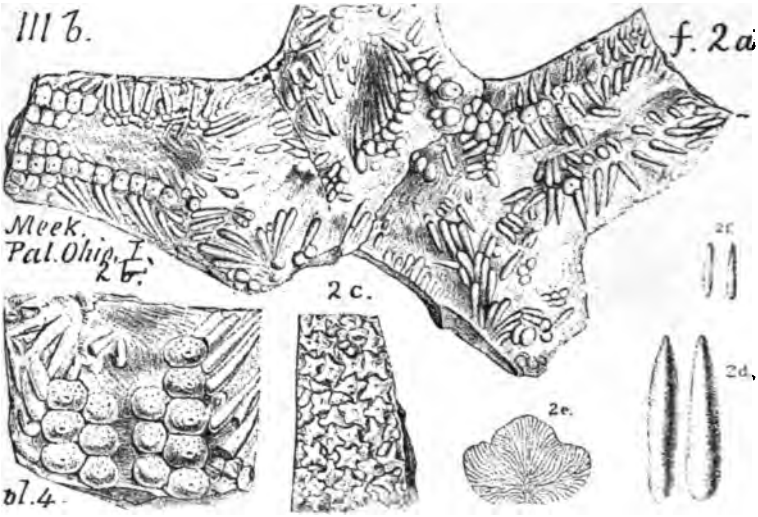

Shield of Palæaspis americana. (Nat. size.)

Palæaspis bitruncata. Claypole. F2, preface page xii. Q. J. G. S. London, XLI. page 65.—*New Bloomfield sandstone* at the top of the Salina formation in Perry Co., Pa. *V c.*


Shield of Palæaspis bitruncata. (Nat. size.)
V.c.
Q.J.G.S.
XLI.p.65.

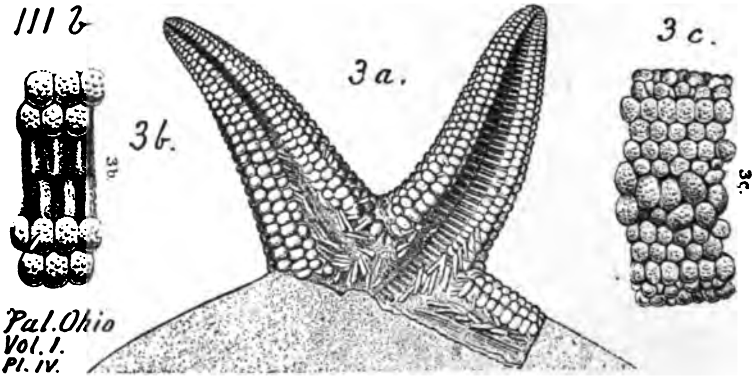
See **Pteraspis**, for figure illustrative of the internal structure of shield.

Palæaster ? dyeri. Meek, American Jour. Sci. Vol. 3, 1872.



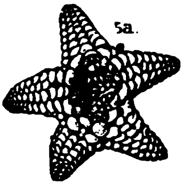
Pal. Ohio, Vol. 1, 1873, page 58, plate 4, fig. 2 *a*, part of ventral side of a specimen, part of disc, parts of rays, some marginal and ambulacral pieces with spines, a few dorsal pieces of one ray distorted, the whole obscured by shale; 2 *b*, *magnified* (X2) underside of part of one ray; 2 *c*, *mag.* (X2) part of upper side, ditto; 2 *d*, *mag.* (X3) two spines; 2*e*, *mag.* (X2) the madreporiform piece; 2 *f*, *mag.* (X3) two very small dorsal spines.—*III b.*

Palæaster granulosus. Hall. 20th Regents Rpt. 1868,

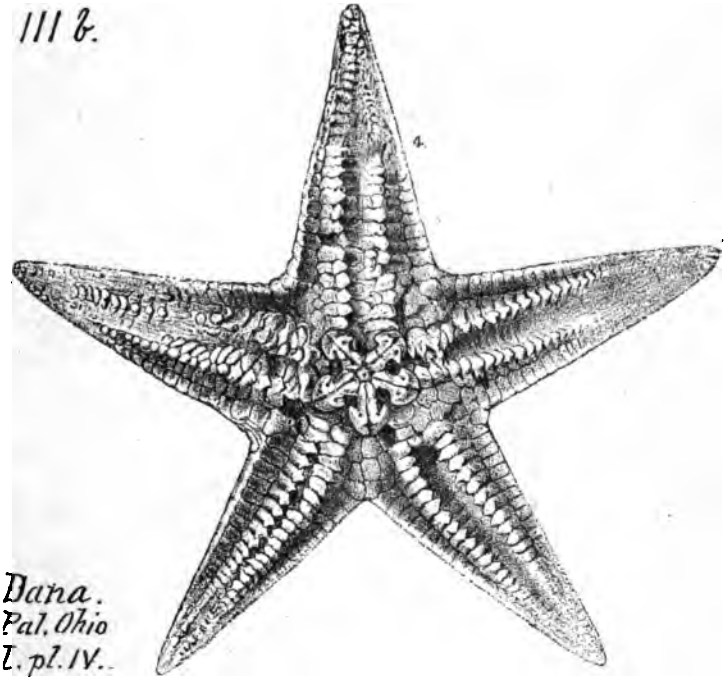


Cincinnatti group. Pal. Ohio, Vol. 1, 1873, page 60, plate 4, figs. 3 *a*, the outer rows of the two rays which are preserved have been pressed round into view from the back side; 3 *b*, *magnified twice;* 3 *c*, *magnified about 2½ times*, to show the dorsal pieces.—*Hudson River slate*, *III b*.

Palæaster incomptus, Meek. Amer. Jour. Science [3] Vol. 3, 1872, *Cincinnati group*.—Pal. Ohio, Vol. 1, 1873, page 64, plate 4, 5 *a*, dorsal side of a compressed specimen, with the pieces somewhat displaced; 5 *b*, the madreporiform body of same, *magnified* about 5 diameters. —*Hudson river shale. III b*.



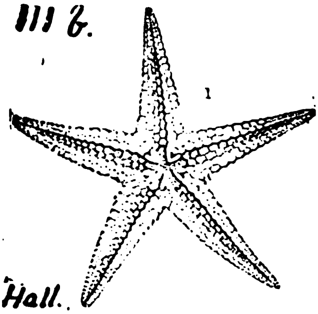
Palæaster ? (*Palæasterina ?*) **jamesi**, Dana, Amer. Jour. Sci. [2] Vol. 35, 1863, *Cincinnati group*.—Pal. Ohio, Vol. 1, 1873, page 62, plate 4, fig. 4, the ventral side of a specimen in Mr. James' collection at Cincinnati, from the *Hudson river shale*, *III b*.



III b.

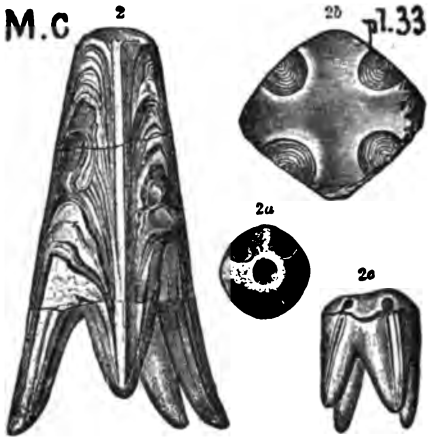
Dana.
Pal. Ohio
I. pl. IV.

Palæaster parviusculus, Billings. Dawson's Acadian Geology, 1868, page 595, fig. 197, *natural size*; rays not separated at base as in *P. niagarensis* (Hall, Pal. N. Y. Vol. 2, p. 247, pl. 51, figs. 21, 22, 23.) Found at Arisaig, Nova Scotia.—*V?*

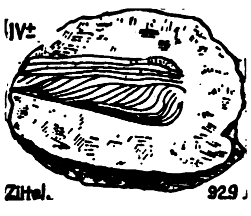


Palæaster shaefferi, Hall, 20th Regent's Report, 1868, plate 9, fig. 2. Copied unto Pal. Ohio, Vol. 1, 1873, page 66, plate 4, fig. 1, an outline view of the central side. Found at Cincinnati in *Hudson River shale formation. III b.*

Palædaphus **(Heliodus) lesleyi,** Newberry, Pal. Ohio, Vol. 2, 1875, page 64, plate 58, fig. 18, *for which see Appendix.*

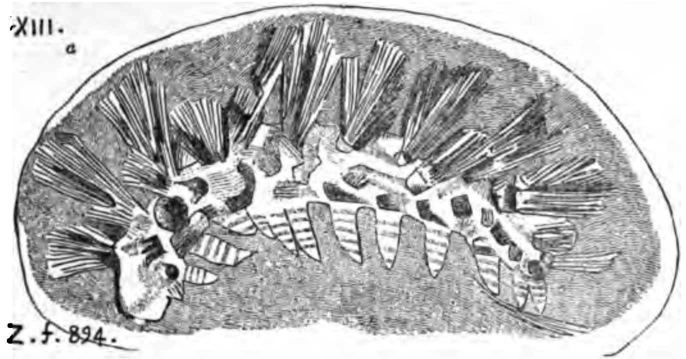


Palænigma wrangeli. (*Tetradium wrangeli.* Schmidt, 1874. Memoirs of the Imp. Acad. St. Petersburg, [7] XXI, No. 11, p. 42; IV, figs. 3 to 8. A sort of primitive *Conularia*, Lindstrom, or connecting link between *Conularia* and *Hyolithes*. *Mathevia* is still more certainly such.) Walcott, Bull. No. 30, p. 223, plate 33, fig. 2 side view; 2 a, section across top; 2 b summit of septum; 2 c, smaller specimen. —*L. C.*

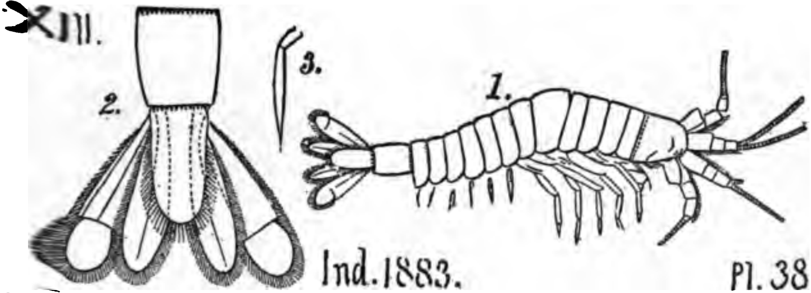


Palæoblattina douvillei, Bgt. An insect found in the *Middle Silurian* rocks of Jurgues in the Calvados of France. Fig. 929 of Zittel's hand book, from a drawing sent to him by Brogniart ($\frac{2}{3}$ nat. size) introduced here as a rare case of extremely ancient palæozoic insect life.—*IV* ±.

Palæocampa anthrax. Meek & Worthen. A thousand-leg (Myriopod) enlarged to twice its natural size, found in a nodule on Mazon Creek, Illinois; with ten segments to its body; with bundles of needles or hairs, two rows of which are visible. Zittel's Handbuch, II, 1885, p. 726, fig. 894. Found in a coal measure nodule on Mazon Creek, Ill., now in the collection of Mr. Lacoe, at Pittston, Pa. See Proc. Acad. Nat. Sci. Phila., 1865, p. 52; Scudder, Mem. Bost. S. N. H., Vol. 3, 1884, p. 293-297.—*Coal Measures. XIII.*



Palæocaris typus. (Meek & Worthen, Illinois, Rt. Vol. 2, p. 405, plate 32, fig. 5; Vol. 3, p. 552; *Acanthotelson inæqualis*, Rt. 2, p. 403, plate 32, fig. 7.) Collett's Ind. Rt. 1883, page 179, plate 38, fig. 1, *enlarged three times*, type specimen, compressed a little obliquely, causing the body segments to be a little too broad; fig. 2, *enlarged four times*, telson and side plates attached to tail segment; fig. 3, *enlarged four times*, swimming paddle belonging to the belly. Above coal L, Ind. At first supposed to be an *Isopod* (*Acanthotelson*); afterwards better specimens caused the establishment of a new *Macrourian* genus (*Palæocaris.*) Collett. *XIII.*

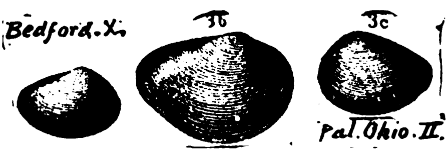


Palæolithic human sculls in the Peabody Museum of Archæology, at Cambridge, Mass., found in Delaware river gravel, at the ballast quarries at Trenton, N. J.

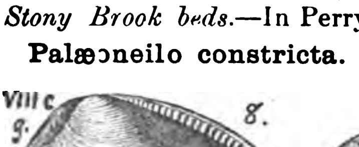
Palæomanon bursa. See **Astylospongia bursa.** *V b.*

Palæoneilo barrisi, W. and W. See **Palæoneilo sulcatina,** Hall. (*Leda nuculiformis*, Stevens; *Leda barrisi*, W. and W.; *Nucula hubbardi*, Winchell.)—In Perry Co., Pa., Claypole's specimen 11977 (50, -8, 28) was collected at Montebello Narrows from *Lower Helderberg upper shaly beds VI;* but he places the name in the *Kings Mill series* at the top of the Chemung. See Cat. OOO, specimen 12434 (103-10.)

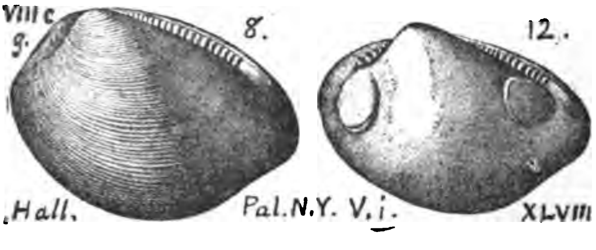
Polæoneilo bedfordensis, Meek, Pal. Ohio, Vol. 2, 1875, page 298, plate 15, fig. 3*a*, a cast, mainly of exterior, hinge exposed showing little teeth, *natural size;* 3 *b*, *magnified*, same; 3 *c*, right side of another specimen in the same condition. *Bedford shale* of Ohio. *X.*—*Doubtfully* recognized by Heilprin among the anthracite fossils of the Wyoming Historical Society. An. Rt. 1885, page 451.—*XIII?*


Bedford. X.
3b
3c
Pal. Ohio. II.

Palæoneilo brevis, Hall. Prelim. Notice Lamell. 1870; Pal. N. Y., Vol. 5, part 1, p. 342, pl. 50, fig. 29 and 31 (selected from nine). *Chemung.*— Found in Pennsylvania (OO, p. 235) at Marshall's Creek, Monroe Co. Spec. 804–65, in *Hamilton strata. VIII c.*—In Columbia Co. Bloomsburg, Spec. 12269 (80-18) *Catskill, IX;* Spec. 12373 *Stony Brook beds.*—In Perry Co., 12557 *Catskill, IX.*



Palæoneilo constricta. (*Nucula bellatula*, Hall; *Nuculites constricta*, Conrad, 1842, Jour. Ac. N. Sc. Phil. Vol. 8.) Hall. Pal. N. Y. Vol. 5, part 1, p. 333,

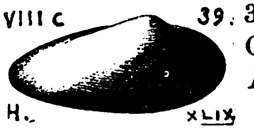


pl. 48, fig. 8, 12, selected out of a dozen figures.—At Huntingdon, Pa., in the upper half of the *Hamilton shales* near where the road leads into the cemetery, and at the Mapleton bridge among the crowds of fossils which fill the upper 50′ of the same shales. T3, p. 109, spec. 197–12.—At Selinsgrove (OOO, specimen 78 B–12) in *Marcellus*, *VIII b*.—In Perry Co., Junkin's farm, 5 m. S. of N. Bloom., specimen 57–26, 29, 37, in *Chemung–Catskill*, *VIII–IX;* at Drumgold's tannery, sp. 99, in *Hamilton upper shale;* at Dorran's narrows, sp. 118–18, 23, in *Hamilton upper shale*. *VIII c;* at Montebello narrows, sp. 144–3, in *Chemung*, *VIII g;* sp. 243–4; opposite Newport, sp. 27–13, 14, 26, in *Chemung*.—*VIII b* up to *VIII–IX.*

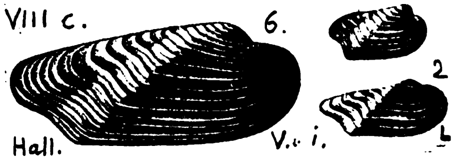
Palæoneilo cuneata. See **Tellinomya cuneata.** Simpson.

Palæoneilo diminuens. See **Tellinomya diminuens.** Simpson. *V a.*

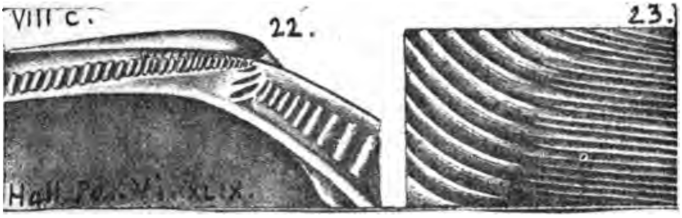
Palæoneilo elongata, Hall. Pal. N. Y. Vol. 5, part 1, p. 345, pl. 49, fig. 39.—In Perry Co., Pa., Claypole's spec. 5–174, at Barnett's mill, in *Hamilton upper shale. VIII c.*



Palæneilo emarginata. (*Nuculites emarginata*, Conrad, An. Rt. N. Y. 1841, *Hamilton.*) Hall, Pal. N. Y. Vol. 5, part 1, p. 338, pl. 50, fig. 1, 2, 6 (selected from eleven figures).—n Perry Co., Pa., at Comp's mill, Claypole's spec. 2–17; arnett's mill, 5–50; Drumgold's tannery, 99–31; Dorran's narrows, 118–22; all in *Hamilton upper shale*.—In Huntingdon Co., at Rough and Ready, spec. 196–3, in *Ham. sandstone* and *ottom beds of Ham. middle shales.* (T3, p. 111.) *VIII c.*



Palæoneilo fecunda, Hall. Prelim. Notice, Lamellibranch

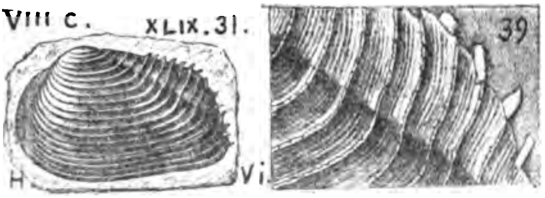

VIII c.
22.
23.
Hall Pa. V. XLIX.

shells, 1870, *Hamilton.* Hall, Pal. N. Y. Vol. 5, part 1, p. 336, pl. 49, fig. 22, 23 (selected from nine figures).—In Perry Co., Pa., at Barnett's mill, spec. 5–31, from *Hamilton upper shale.* —In Monroe Co., Marshall's creek, (OOO) spec. 804–25, 807–30, from *Hamilton. VIII c.*

VIII g.
35
H. VI.
XLIX

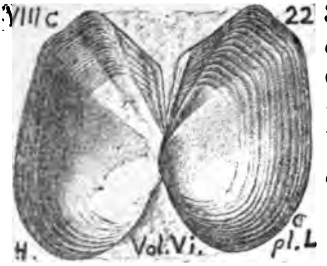
Palæoneilo filosa. (*Nuculites filosa*, Conrad, 1842, Jour. Acad. Nat. Sci. Vol. 8, *Chemung.*) Hall, Pal. N. Y. Vol. 5, part 1, p. 343, pl. 49, fig. 35 (selected from six figures).—In Perry Co., Pa., at Comp's mill, spec. 2–26, in *Hamilton upper shale;* in Middle ridge, N. of N. Bloomfield, spec. 39–11, in *Chemung;* on Carlisle road, 53 C–10, *Chemung.*— At Bloomsburg, Pa., in beds 38, 41, of section 13 (G7, p. 69); and bed 68 of section 78 (p. 287) *200' and 600' above the top of the Genesee*, in *Chemung* [*Portage?*] *VIII c, f? g.*—Type specimen (named by H. S. Williams) 12147 (66–3) from Ithaca, N. Y. *Chemung, VIII g.*

Palæoneilo maxima. (*Tellina ovata.*) Hall, page 196, fig. 78, 6. *Hamilton.* (Conrad, *Nuculites maximus*, Ann. Report, N. Y., 1841.)—In Perry Co., Pa. Comp's mill, Spec. 2–15; Barnett's mill, 5–33, 113 (seven); Drumgold's tannery, 99–24, 26, 27; all from *Hamilton upper shale, VIII c.*—In Westmoreland and Fayette Cos., Pa., from *Devonian strata* in the river gaps, K3, p. 311.—*VIII–IX.*

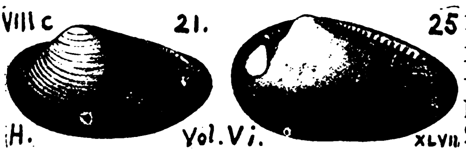


Palæoneilo muta. Hall, Prelim. Notice Lamiell. 1870, *Hamilton.* Pal. N. Y. Vol. 5, part 1, p. 337, plate 49, fig. 31, 32, (selected from eight figures.)—In Perry Co., Pa., found at Barnett's mills, Spec. 5–100, in *Hamilton upper shales.* [In Mifflin Co., at McKee's ore bank, C. E. Hall got Spec. 501–51, an impression of a shell much resembling this species, from the *Clinton shale over the fossil ore bed, V a.*]—*VIII c.*

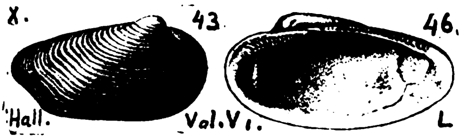
Palæoneilo perplana, Hall, Pal. N. Y. Vol. 5, part 1, p. 339, plate 50, fig. 22 (selected form eight.)—In Huntingdon Co., Pa. Collected by I. C. White, at the long railroad cut near Cove station, in the bottom beds of the *Hamilton Middle shales*. T3. p. 111.—*VIII c*.



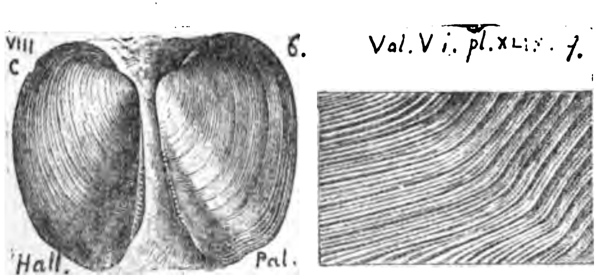
Palæoneilo plana, Hall. (*Nuculites maxima*, Conrad; *Palæoneilo maxima*, Hall; *Tellina?* *ovata*, Hall.) Pal. N. Y. Vol. 5, part 1, p. 334, pl. 48, figs. 21, 25.—In Perry Co., Pa., at Barnett's mill, Spec. 5–162, *Hamilton upper shales*, *VIII c*.—At Bloomsburg, Pa., Spec. 84–7, 100–12, both in *Chemung*—Also Spec. 806–15.—*VIII g*.



Palæoneilo sulcatina, Hall. (See *Palæoneilo barrisi*, for other synonyms.) Pal. N. Y. Vol. 5, part 1, p. 347, plate 50, figs. 43, 46 (selected from five.)



Palæoneilo tenuistriata, Hall. See Pal. N. Y. Vol. 5, pl. 1, p. 336, pl. 49, fig. 6, and 9.—In Perry Co., Pa., found at Comb's mill, Spec. 2–19, from *Hamilton upper shale*, *VIII c*.—In Huntingdon Co., at Mapleton, Spec. 197–15, from *Oriskany* [?].

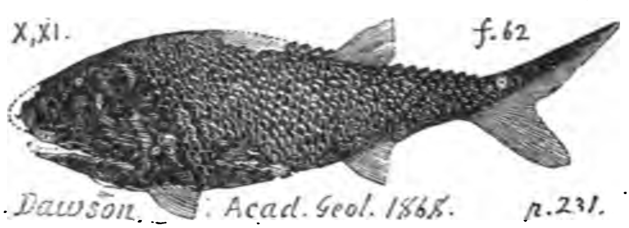


Palæoneilo ? ——— Spec. 804–9, 804–27, both in Fellows' and Genth's collections on Marshall's creek, Monroe Co., Pa., from *Hamilton beds*, *VIII c*.

Palæoneilo———? very small. Spec. 12429 (103–5) ½ mile N. of King's mill, Perry Co., top of *Chemung*. *VIII g*.

Palæoneilo———? in Addison ridge, crest ¼ mile E. of Cherry Grove, E. Providence, Bedford Co., in *Chemung conglomerate*. T2, p. 215.—*VIII g*.

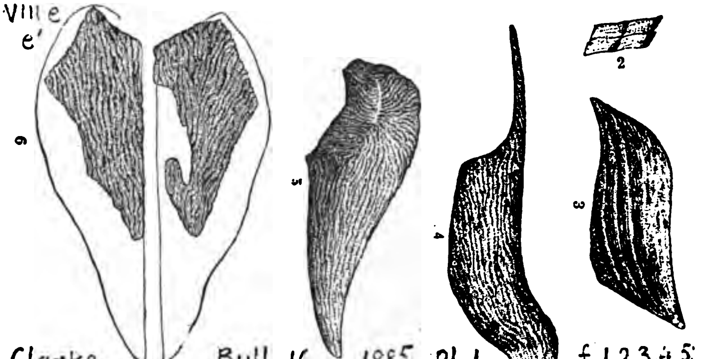
Palæoniscus scales are most abundant of all the genera of fish in the *Meadville upper limestone* in Crawford Co., Pa., hundreds of them covering every slab of the stone, at the Glendale quarries. Q4, pp. 83, 140.—*X*.


X, XI.
f. 62
Dawson. Acad. Geol. 1868.
p. 231.

Palæoniscus alberti ? Jackson. Dawson, Acad. Geol. 1868, page 231, fig. 62, one of a great number of very perfect fish found in the bituminous shale of the Albertite (fossil petroleum) district of the Albert mine, Hillsborough, N. Brunswick; flattened by pressure, but with fins as perfect as in life, and all their scales in place, instead of being scattered about as at the Joggins and generally elsewhere in the Lower Carboniferous strata; in fact the fish have been mummified like the old Egyptians in asphalt It is not likely that any such locality will be discovered in Pennsylvania; but an abundance of the scales of this kind of fish are found in our rocks, and it is well to show the form of the fish that they belong to.

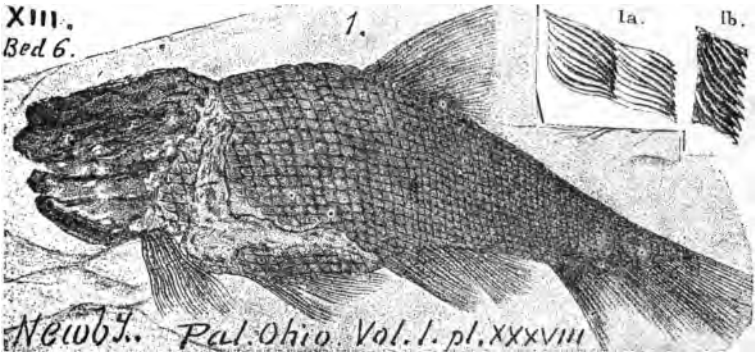
Palæoniscus brainerdi, Thomas. Bost. Soc. N. Hist. Vol. 4, 1853; Pal. Ohio Vol. 1, p. 280, where it is said that although the *Berea Grit* of Ohio is a coarse rock usually barren of all fossils, yet its upper layers at Chagrin Falls contain a large number of this species of fish, no traces which have been discovered elsewhere. See also Pal. Ohio, Vol. 1, p. 346. Mr. G. K. Gilbert, Asst. Geol. Sur. Ohio, discovered in the Berea Grit on Oil Creek (as he understood the rock) in Venango Co., Pa., the most remarkable accumulation of fish spines Dr. Newberry knew, scattered over a detached slab of sandstone, a dozen spines on a surface less than two feet square, all apparently belonging to *Ctenacanthus triangularis*. Other layers at the place were covered thickly with scales of *Polœoniscus*, perhaps *brainerdi*, and teeth of mainly *Holoptychius* and *Orodus*, among them *O. coniculus* a common *Keokuk limestone* species. (Newberry.)

Palæoniscus devonicus. Clark, Bulletin 16, U. S. G. S., 1885, page 20, 41, pl. 1, fig. 2, a fish scale *magnified* twice; 3, a scale *mag. 3 times;* 4, 5, 6, head plates, *mag. twice.* One scale is all that Mr. Clarke had found in the *Genesee black shale*, a few feet over the *Styliola bed*, Glenville, Honeoye lake, N. Y., Many specimens were got from *Naples black shales* at Sparta, in RR. cut; in one case most of the fish was got, but its head bones displaced and tail crushed; fish 5 in. long.— *VIII e & é.*— NOTE.—Hinde found *Palœoniscus* scales in Erie Co., N. Y., *Genesee shale ;* and Dana mentions them in the *black shale* of Kentucky.



Clarke. Bull. 16. 1885. pl. 1. f. 1, 2, 3, 4, 5.

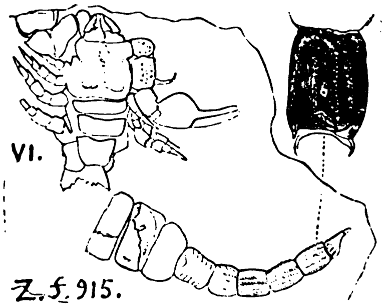
Palæoniscus peltigerus, Newberry. Pal. Ohio, Vol. 1,



Newb. Pal. Ohio Vol. I. pl. XXXVIII

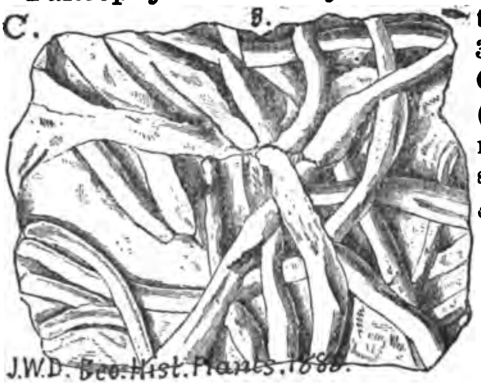
1873, page 345, plate 38, figs. 1, 1*a*, 1*b*, scales. (Described first as *Elonichthys peltigerus*, N. in Proc. Acad. U. S., Phila.; then as *Palæoniscus peltigerus*, N. in Geol. Sur. Ill., Vol. 2, p. 17.) See the middle row of four large oval ornamented scales running from dorsal fin forward half way to the headplate; and a similar row from dorsal fin backwards, turning into large striated fulcra protecting the end of the backbone. A beautiful fish, once living in the lagoons of the coal-marshes, found in Illinois, Indiana, Ohio, and New Brunswick, Canada, (if C. T. Jackson's specimen from Albert mine be this species.) Belongs to the same group of carboniferous fishes as the English P. *decorus*, Egerton. Cannel coal bed at Linton, O., at Canfield, O. and Fulton Co., Ill.—*XIII.*

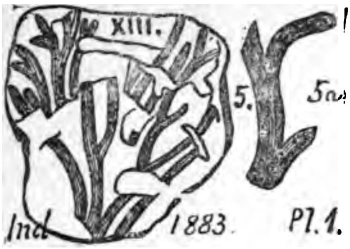
Palæophonus nuncius. Thorell and Lindström. The Swedish Upper Silurian Scorpion, found in 1884, about the same time as the Scotch U. Sil. (Ludlow) scorpion, and two years later than the New York (Waterville) Lower Helderberg scorpion (**Proscorpius osborni**, Whitfield, described 1885) 1882. Zittel's Handbuch, 1885, Vol. 2, page 738, fig. 915. (copied; *nat. size.*) *VI.*



Palæophonus osborni, Whitfield. See **Proscorpius osborni.** (Science, Vol. 6, 1885, p. 88.)

Palæophycus beverlyensis. Dawson. Geological history of plants, 1888, page 30, fig. 8, a supposed Cambrian seaweed (fucoid,) but probably a mould of the track of some animal.—*Cambrian rocks. C.*



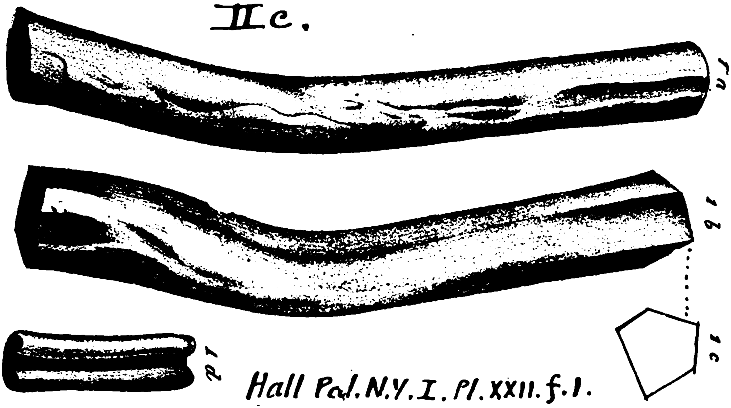


Palæophycus gracilis, (Lesquereux, Coal Flora of Pa., 1880, page 11, plate B, figs. 9 to 10*a*. Geol. Rt. Indiana, 1875, page 137, plate 1, figs. 4 to 5*b*; surface smooth; sometimes rough or dotted; from ore balls in clay over coal L, Vigo Co., Ind.)—Collett's Indiana Rt. of 1883, page 33, plate 1, fig. 5, 5*a*. Possibly a mere variety of *Palœophycus milleri*, with which it is found. Collett.—*Coal Measures*, *XIII.*

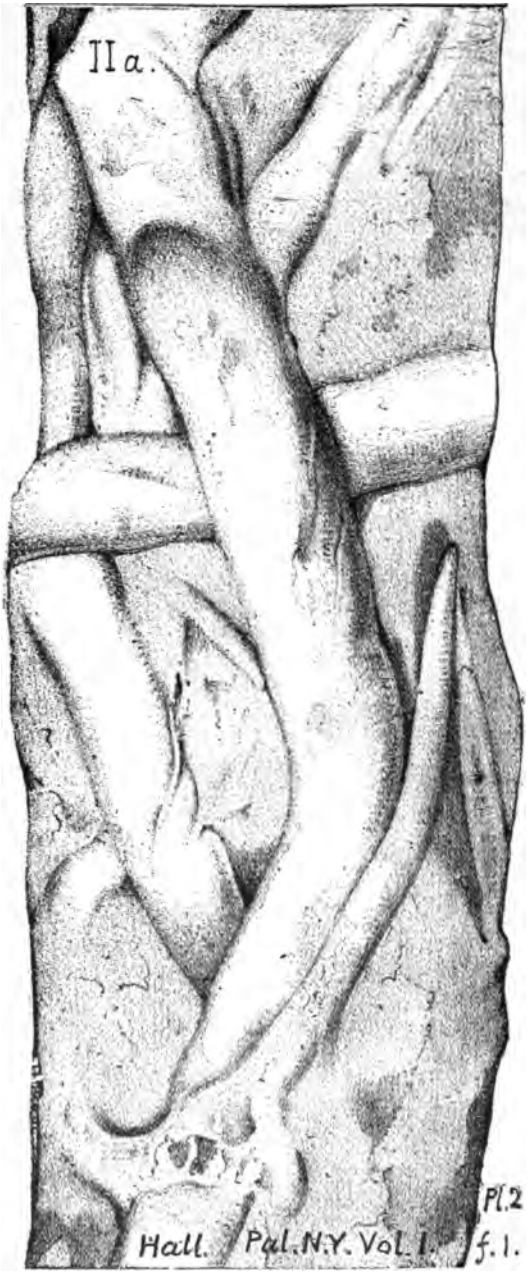
Palæophycus irreguiaris, Hall. *For figure and description of this see page 589.*

Palœophycus milleri. See **P. gracilis.** XIII.

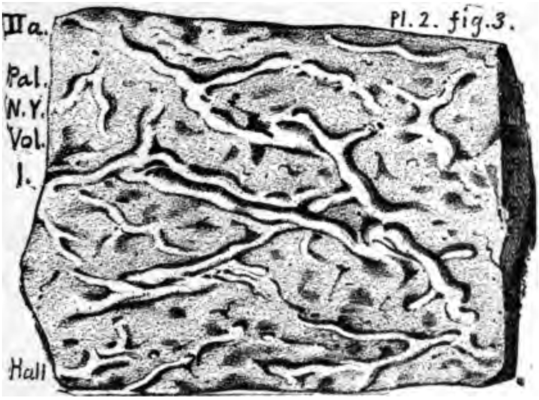
Palæophycus simplex, Hall, Pal. N. Y., vol. 1, page 63, plate 22, figs 1*a*, *b*, *c*, *d;* sea weeds, apparently hollow tubes, flattened and made angular by compression. Certainly there can be no doubt that these are not worm burrows. The crust was undoubtedly thin, soft, and flexible, for they are often bent back on themselves, and are filled with fragments of shells, crinoidal discs, etc. They are in fragments, sometimes six inches long and a half an inch wide. Found in great numbers but only in the shaly layers of the New York *Trenton formation.*—In Pennsylvania found in Centre Co, Bellefonte, Fellows' collections, spec. 210–83 (fair specimen) from *Trenton limestone*, *II c.*


IIc.
1a
1b
1c
1d
Hall Pal. N.Y. I. Pl. XXII. f. 1.

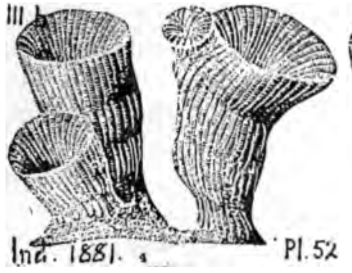
Palæophycus tubularis, Hall. Pal. New York, Vol. 1, page 7, pl. 2, fig. 1, (figs. 2, 4, 5, omitted,) showing sea weeds of the earliest Siluro-cambrian age, flattened and heaped together on a sandy shore; the smaller ones apparently solid; the larger ones hollow; more abundant towards the top of the great limestone formation, some times with fossil shells. Good localities in the Mohawk valley, at Amsterdam, opposite Fort Plain; at Canajoharie, etc.—*Calc. sandstone. IIa.*

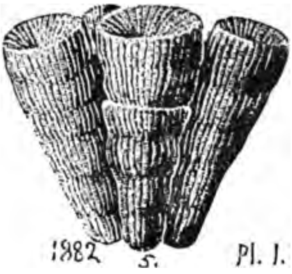

IIa.
Hall. Pal. N.Y. Vol. I.
Pl. 2
f. 1.

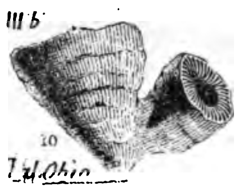
Palæophycus irregularis, Hall. Pal. N. Y. Vol. 1, page 8. pl. 2, f. 3, of a seaweed which covers whole slabs of the *Calciferous sandstone* strata, near the bottom of the formation near Chazy, and Keeseville, also between Flint Hill and Amsterdam in the Mohawk valley.—*II a.*

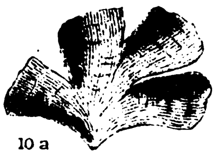


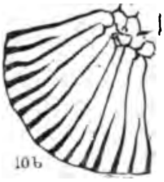
Palæophyllum divaricans. (*? Cyathophyllum dianthus*, Goldfuss.) Nicholson. (Pal. Ohio, Vol. 2, p. 220.) Collett's Indiana Report 1881, page 377, plate 52, fig 4; Report 1882, page 251, plate 1, fig. 5. At Cincinnati (Nicholson); at Dayton, O. (Van Clive.)—*Hudson river* (*Cincinnati*) *formation*, *III b.*—See also Pal. Ohio, Vol. 2, 1875, page 220, plate 22, fig. 10, *natural size*, small specimen with one bud; 10 *a*, another with four buds; 10 *b*, *enlarged*, septa coalesce internally and form vesicular tissue.—*III b.*

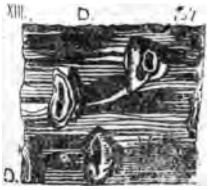






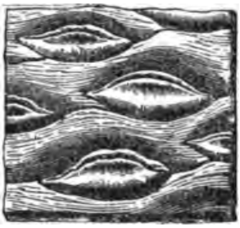






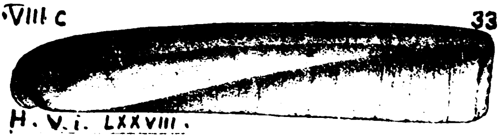
Palæopteris acadica, Dawson. Acadian Geology, 1868, page 449, fig. 167 D, *half natural size*, scars left by the fallen leaves. Nova Scotia *coal measures*. *XIII.*

Palæopteris harttii, Dawson. Acadian Geology, 1868, page 449, fig. 167 C, scars left by the fallen leaves, *half natural size.* Nova Scotia *coal measures. XIII.*



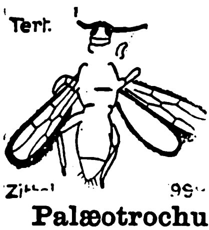
Palæopteris ——— ? Spec. O, 2876, 2877, in grey shale, Haskellwell, Venango Co.—Spec. 2879, 2887, greenish shale, Holbrook farm 2 m. S. W. of Pleasantville.—Spec. 2892, in coarse micaceous sandstone, Triumph, Warren Co.—*X.*

Palæosolen (*Solen*), Hall. (*Orthonota siliquoidea*, Hall. Prelim. Not. Lamell. shells, 1870.) Pal. N. Y., Vol. 5, part 1, plate 78, fig. 33, right valve, *Hamilton.*—Called by Claypole in Perry Co. a form of the *Hamilton proper;* but in Columbia Co, on Stony Brook, a shell "*near siliquoidea*" was found by White (G7, 72) in the *Chemung*, at least 2,000′ above the top of *Hamilton.*—*VIII g.*

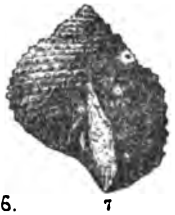


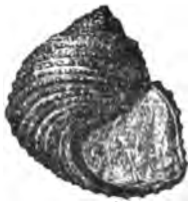
Orthonota undata. See **Sanguinolites undatus.**

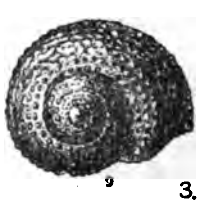
Palæothrips fossilis, Scudder. A minute insect from the *Oligocene ? tertiary beds* of Utah. Figure 999 (*magnified twelve times*) in Zittel's Handbuch, introduced here to show what may perhaps be found in some of the fine pond clays of Pennsylvania.—*Tertiary.*



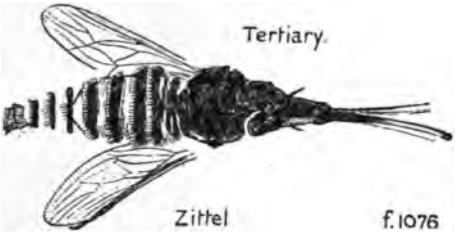
Palæotrochus (*Trochus*) **præcursor.** Clarke, Bull. 16, U.S.G.S. 1885, p. 55, pl. 3, fig. 6, *natural size,* 7, 8, 9,







magnified twice; 5 whorls; spiral rows of tubercles on surface, usually 8 above and 7 below the keel, the intervals crossed by microscopic lining. *Naples beds* (*Upper Genesee.*)—*VIII e.*



Palembolus florigerus, Scudder. An insect found in the *Oligocene tertiary beds* of Florissant, Colorado. Fig. 1076 (*magnified twice*) in Zittel's Handbuch; showing the possible perfection of fossilization of even the most delicate tissues.—*Tert.*

Paleschara maculata, Hall. (*Paleschara? aspera,* Hall.)

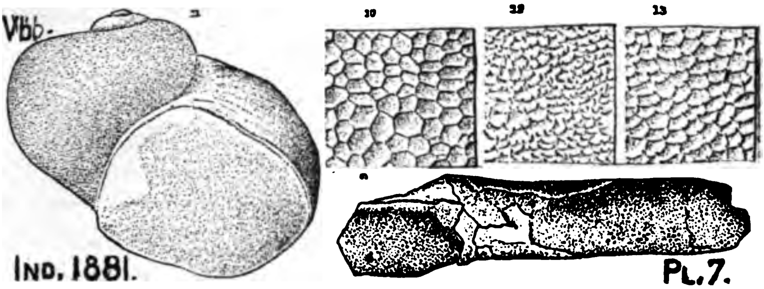
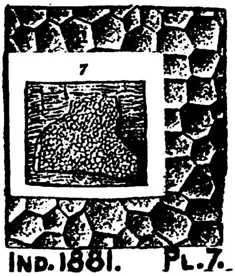
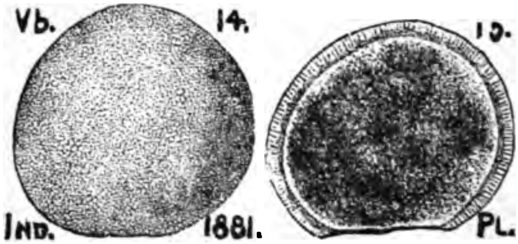


Figure from Collett's Indiana Report of 1881, page 246, plate 7, fig. 9, *natural size*, encrusting some foreign cylindrical body; fig. 10, *enlargement* of surface *six times*, showing near the centre one of the spots (*maculæ*); fig. 11, a *Platystoma* shell encrusted with the bryozoon; fig. 12, oblique side view of a bit of the surface, *enlarged six timee*, showing roughnesses at angles of cells; fig. 13, *still more enlarged*, looking directly into the cells.—*Niagara limestone*, *V b.*



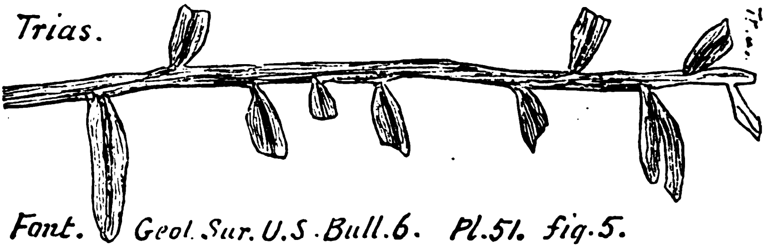
Paleschara offula, Hall. Doc. Ed. 28th Report N. Y. State Mus. Figure from Collett's Indiana Rt. of 1881, page 245, plate 7, fig. 7, *natural size*, a fragment of this bryozoon encrusting some foreign substance; fig. 8, *enlarged six times*, to show shallow polygonal cell structure. Apparently this species has no spots (*maculæ*) of larger cells, or barren spaces. —*Niagara limestone*, *V b.*

Paleschara? (*Chætetes?*) **sphærion,** Hall. Fig. from Collett's Indiana Report of 1881, page 247, plate 7, fig. 14, *enlarged twice*, one side of the colony of bryozoa, showing arrangement of cells; fig. 15, *enlarged twice*, section through centre; dark line at base of cell represents solid cell floor, cell itself being filled with limey clay. Cells somewhat more regularly six sided than in other species, and never deep like *Chætetes*. Spots (*maculæ*) more conspicuous than in *P. maculata*, but large spots not so much larger in proportion.—*Niagara*, *Vb.*



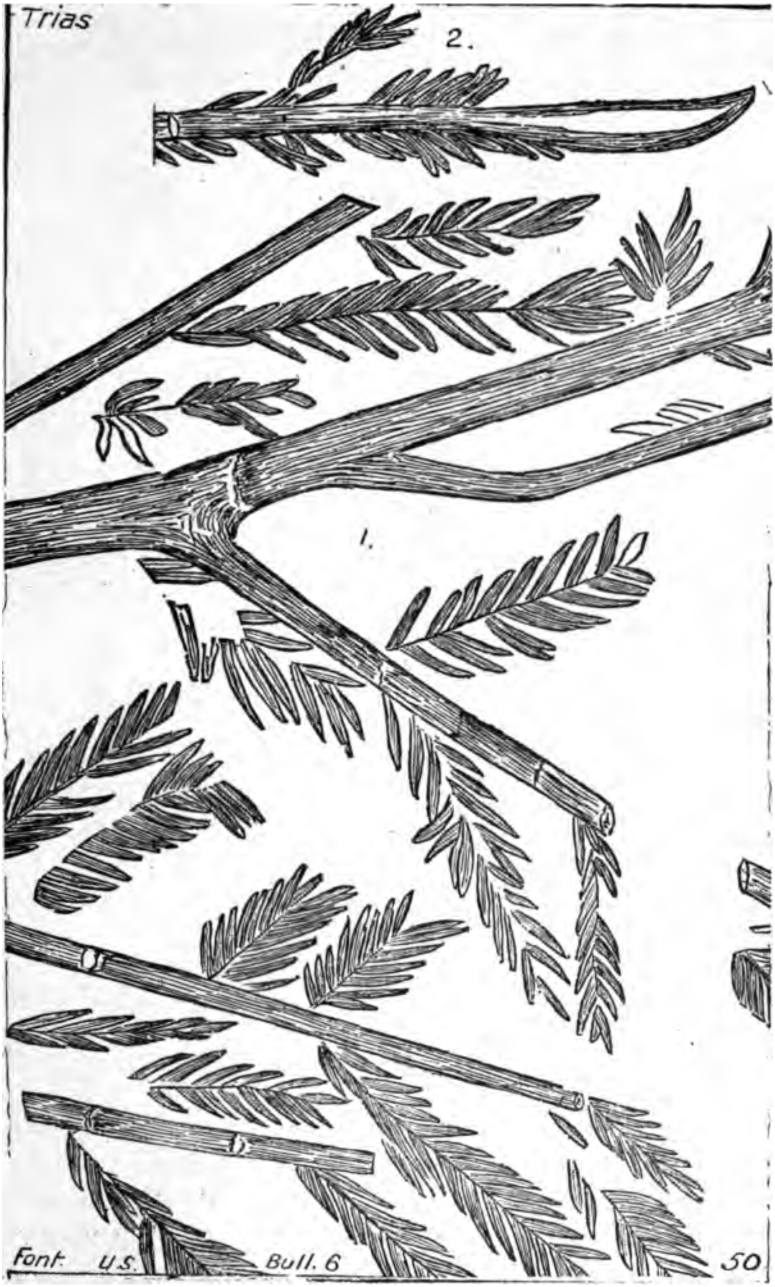
Palissya braunii, Fontaine. (*Walchia longifolius*, Emmons, Amer. Geol., p. 105, plate 4, figs. 72, 73) Mon. U. S. Geol. Sur. 1883, p. 107, plate 50, fig. 1, part of a large branch; fig. 2, summit of branch with cone? (pl. 51, fig. 1, omitted.) Evidently the common *P. braunii* of the *Rhætic* beds of Europe, and the *Rajmahal* coal of India (*P. indica.*) N. C. *Triassic coal. Tr.—For fig. see p. 593.*

Palissya carolinensis, (*Pachypteris* Emmons' Amer. Geol. p. 112, f. 80.) Fontaine's Monog. U. S. Geol. Sur. Vol. 6, 1883, page 109, plate 51, fig. 5, evidently a conifer, and apparently a *Palissya* with a strong midrib which has lost many of its leaves.—N. C. *Trias.*

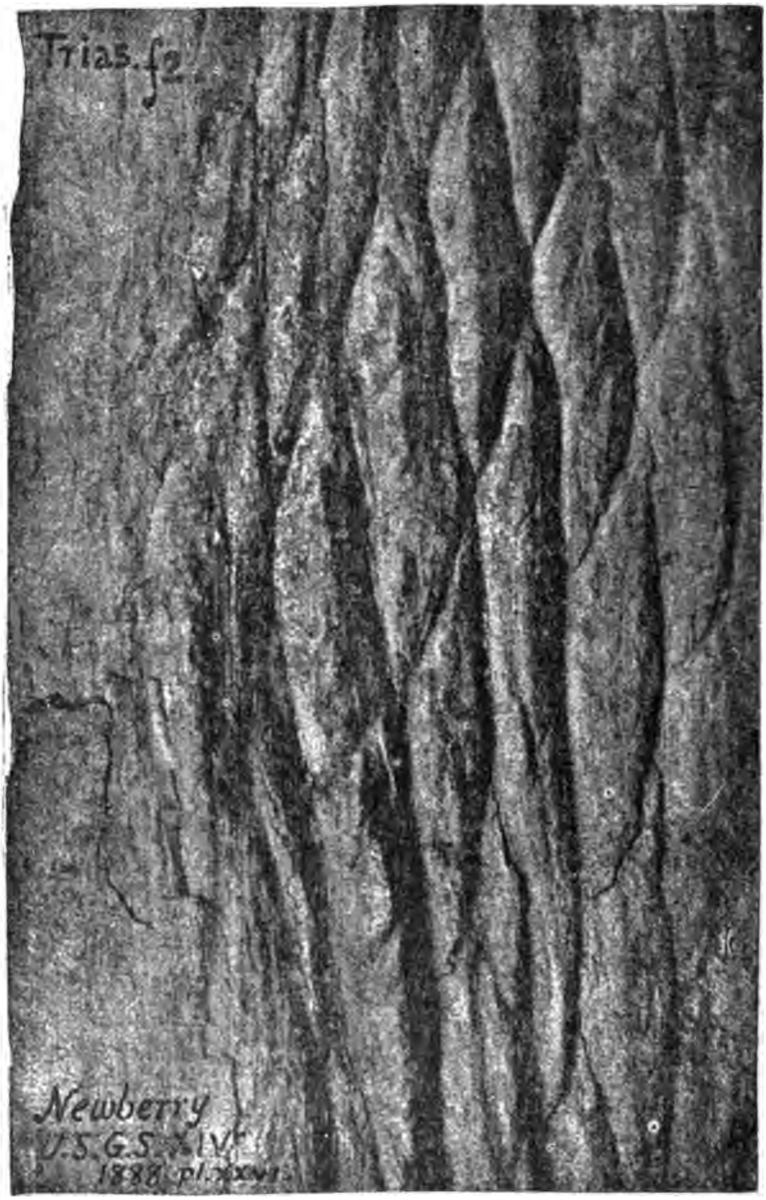

Trias.
Font. Geol. Sur. U.S. Bull. 6. Pl. 51. fig. 5.

Palissya diffusa, (*Walchia diffusa*, Emmons. Am. Geol. Pl. 3, f. 2.) Fontaine's, Bull. U. S. G. S. No. 6, p. 106, pl. 51, f. 4; strikingly like the East Indian *Palissya conferta*, Feist. of *Lias* (?) age but with many *Rhætic* plants.—N. Car. ***Trias.*** *—For figure see page 595.*

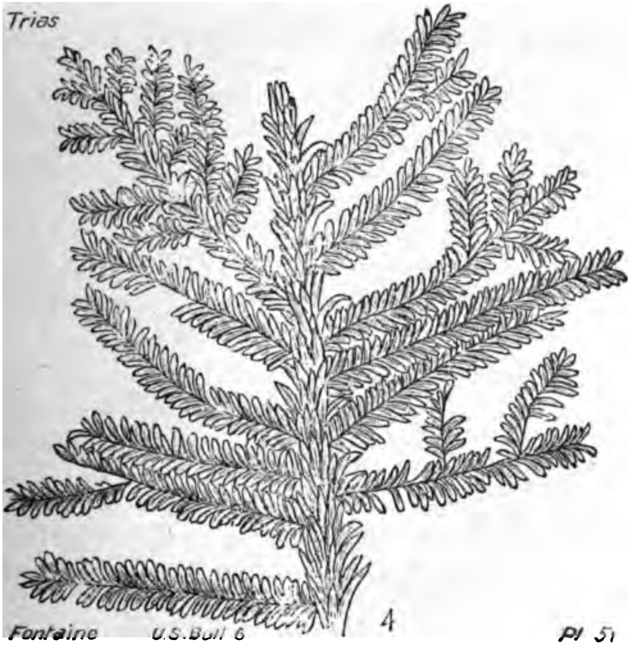
(**Palissya braunii.** *See p. 592.*)



Palissya ? Trunk of a conifer, decorticated, or stripped of its bark, and showing rhomboidal markings, found at Newark,



(**Palissya diffusa.** *See page 593.*)



(**Palissya** ——— ? *continued from page 594.*)

N. J. Newberry's Monograph of Trias plants and fishes, in U. S. G. S. Vol. 14, page 94, plate 26, fig. 2, (fig. 1, a variation, omitted.)—*Trias.*

Palynotus boltoni. (*Paradoxides boltoni.*) See **Lichas boltoni.** *V b.*

Paolia gurleyi, Scudder. An insect found at French Lick, Orange Co., Ind. Proc. Amer. Acad. A. & S. Vol. 20, 1885, p. 173. *Lower Coal measures, XIII.*

Paolia lacoana, Scudder. An insect found in the black shale, base of the Conglomerate, in the Susquehanna river gap above Pittston, Luzerne Co., Pa. Proc. Amer. Acad. Vol. 20, p. 173. Lacoe's collection.—*XII.*

Paolia superba, Scudder. An insect found in a Mazon Creek nodule, Ill. Proc. Amer. Acad. Vol. 20, p. 173. *Coal measures, XIII.*

Paolia vetusta.' Smith. A dragon fly's wing from near Paolia, Orange Co. Ind. Amer. Jour. Sc. [3] Vol. 1. 1871, p. 44–46. Figure taken from Zittel's Handbuch, 1885, Vol. 2, p. 758, fig. 942, *natural size*. NOTE. For the kind of creature, see **Titanophasma fayoli**.—*Coal measures*, *XIII*.

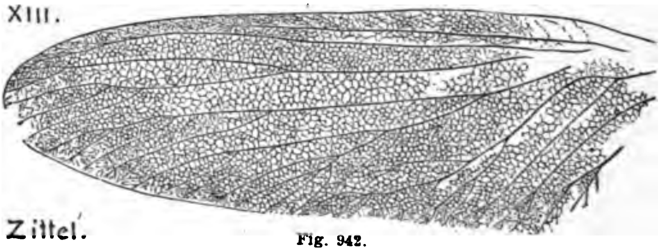
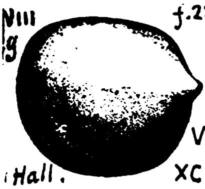


Fig. 942.

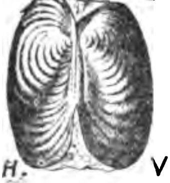
Paracyclas elliptica. Hall, page 171, fig. 67, 2, *VIII a* Upper Helderberg (Corniferous) formation, **Paracyclas** *elliptica*, Var. **occidentalis,** Hall, 24th Regent's Report, N. Y., 1872. Upper Helderberg formation.—See **Marshall's** Creek, Monroe Co. Specimen 804–1, etc. (possibly *P. lirata*), from *Hamilton strata*, *VIII c*.

2

Paracyclas erecta, Hall. Palæontology of New York, Vol. 5, part 1; page 445, plate 95, fig. 22. *Chemung*.—Recognized by Simpson in Randall's collections at Warren, Pa., as specimens (OOO) 9545, 9581, 9583, wrongly labelled *Schizodus*. *Upper Chemung* or *Lower Catskill*. *VIII–IX*.



Paracyclas (*Lucina*) **lirata**, Hall. (*Posidonia lirata*, Conrad. An. Rt. N. Y., 1838. *Corniferous limestone*.) Hall, Pal. N. Y. Vol. 5, pl. 1, plate 72, figs. 13, 14, (selected out of eighteen).—Found by J. J. Stevenson (T2, p. 226) in sandstone bed, No. 30, of his Yellow creek section, Hopewell township, Bedford Co., Pa., lying 2,957′ beneath his assumed base of Catskill formation No. *IX*, and therefore in *Hamilton strata*, *VIII c*.—Spec. 804–1, 2, 3, 7, 8, 37, 55, 66 (both valves, crushed) 804–82 (crushed),

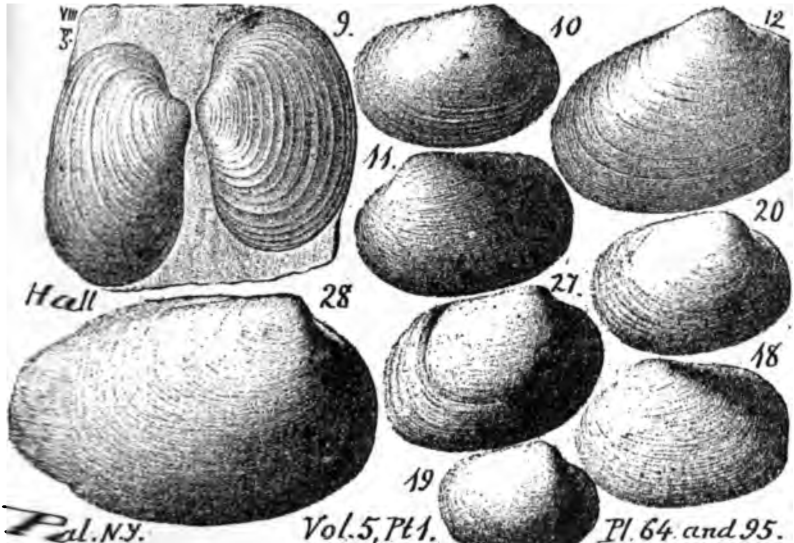


13.

14.

804–104 (crushed), 807–16 (good), all Kintner's farm, Marshall's Creek, Monroe Co.; and 808–23 (crushed), Dingman's Falls, Pike Co. *Hamilton*, *VIII c.*—In Perry Co. Comp's mill, Spec. 2–4 (13 ex.), *Hamilton upper slate*, *VIII c.*—See also, Pal. Ohio, Vol. 1, 1873, wood cut, page 200. *Corniferous limestone*, *VIII a.*

Paracylas (**Edmondia**) **obovata**, Hall. (*Edmondia philipi*,

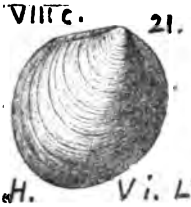


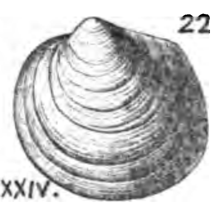
Hall; *E. burlingtonensis*, White and Whitfield.) Pal. N. Y., 1885, page 389, plate 95, fig. 9, both valves united; 10, left valve, doubtful species; 11, 12, left valves; plate 64, figs. 18, 20, 27, 28, 29. Hall notes that it differs from *E. philipi* by being more broadly elliptical, and its beaks further back. He quotes it from the *Chemung* at Mansfield, Tioga Co. Pa. and at Hobbieville and Phillipsburgh, N. Y. *VIII g.*

Paracylas (*Edmondia*) **subovata.** Doubtfully identified by G. B. Simpson, in Spec. 860–36, of Sherwood's Coll., Mansfield, Tioga Co. *Upper Chemung*, *VIII g.*

Paracyclas (*Lucina*) **ohioensis**, Meek, Proc. Acad. Nat. Sci. Phila., 1871.—Pal. Ohio, Vol. 1, 1873, page 199, plate 18, fig. 7 *a*, *b*. Considered by Prof. Hall, and Mr. Whitfield as the same as the New York *Lucina lirata* of Conrad. *Corniferous formation* in Ohio. *VIII a.*

Paracyclas tenuis, Hall, Pal. N. Y. Vol. 4, page 172, figs. 20, 21. The figures here given, are copies, by Van Iterson, of Hall's figs. 21, 22, (20 omitted,) in Pal. N. Y. Vol. V i, p. 443, plate 72. On plate 95, fig. 25 represents the same species. *Hamilton*, *VIII c.*—Doubtfully identified in Pa. in Sherwood's Mansfield Coll., Tioga Co. Spec. 860–18, *Upper Chemung*, *VIII g.*



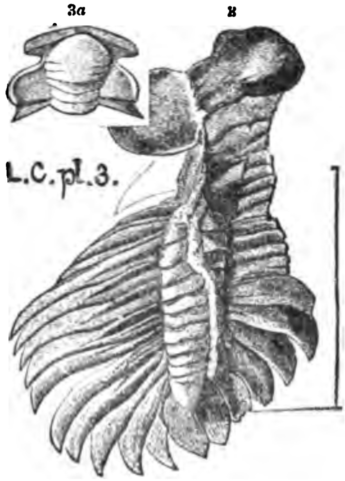


Paracyclas venusta. Title to Spec. 9547 of Randall's collection at Warren, Pa. (*? Pararca venusta*, Hall.) *VIII g.*

Paracyclas ——— *new species?* Spec. 804–37 from Marshall's Creek, Monroe Co., Pa. *Hamilton*, *VIII c.*

Paradoxides. Genus discussed by Walcott, Bull. 30, p. 165. The **Paradoxides** *fauna of Mt. Stevens* in Western Canada by Rominger, Proc. Acad. Nat. Sc. Phila., 1887, January, p. 19, is discussed by Walcott as *Middle Cambrian* in Am. Jour. Sci. Sep. 1888.

Paradoxides acadicus. Matthew, (1882, Trans. Roy. Soc. Canada, p. 103, plate 9, figs. 16 to 18.) Walcott, Bulletin No. 30, U. S. G. S. page 25, plate 3, fig. 3, a distorted specimen of the trilobite, *enlarged to twice its size.*—Saint John formation. Portland? New Brunswick. *Middle Cambrian. M. C.*



P. acadicus, var. **suricus**, Matthew, Trans. R. S. Can. 1885, page 77. *St. John group.*

Paradoxides arcuatus, Harlan, Trans. Geol. Soc. 1835. See **Triarthrus beckii.** (S. A. Miller.)

Paradoxides asaphoides. See **Olenellus asaphoides**. Ford. Page 489 above. *Lower Cambrian. L. C.*

Paradoxides asaphoides. See **Olenellus thompsoni.** *L. C.*

Paradoxides boltoni. (*Platynotus boltoni*). See **Lichas boltoni.** *V b.*

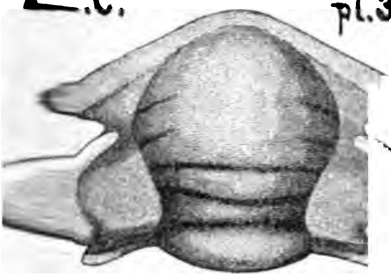
Paradoxides decorus, Billings, Pal. Foss. Vol. 2, 1874, page 75, *Upper Taconic.* (S. A. Miller.)—*M. C.*

Paradoxides eatoni, a synonym for *Triarthrus beckii.* (S. A. Miller, 1889.)

Paradoxides eteminicus. Matthew. (1883, Trans. R. Soc. Canada, Vol. 1, p. 92, plate 10, figs. 7 to 12.) Walcott, Bulletin No. 10, U. S. G. S., page 27, plate 3, fig. 1, *suricoides;* fig. 2, small tail; 1 b, medium sized head, flattened; (1 c, *breviatus;* 1 d, *pontificalis;* these varieties omitted); all the above copies of Matthew's figures.) Fig. 1 e, head of young individual in Hartt's collection, shortened by compression; *enlarged twofold* (1 f, omitted) 1 g, head with narrow front rim, *enlarged twice,* (after Matthew.)—Saint John formation. Portland, N. Brunswick. *M. C.*

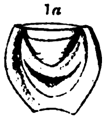
L.C. pl.3.

1

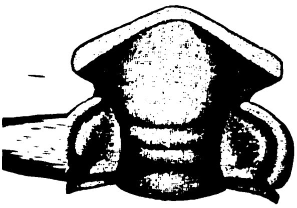


1e

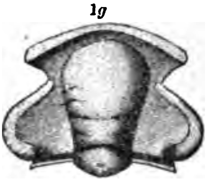
1a



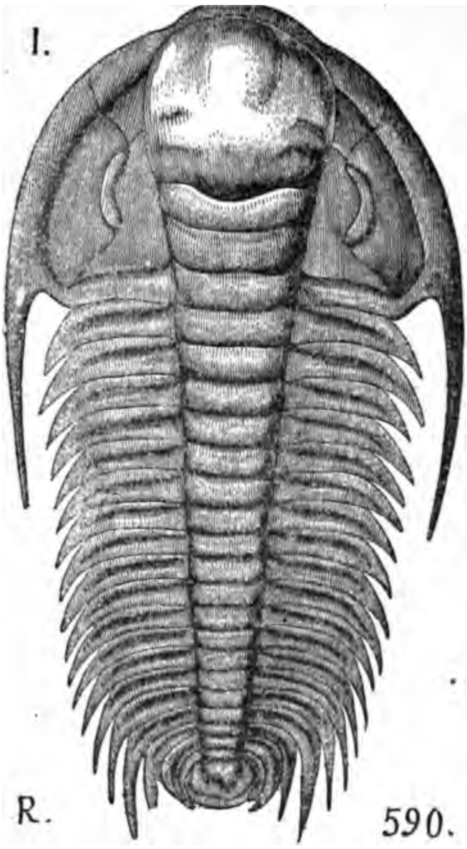
1b



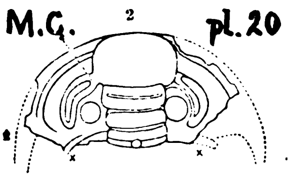
1g



Paradoxides harlani. Green (1834, Amer. Jour. Sci. Vol. 25, p. 336. W. B. Rogers, 1856, Proc. Bost. Soc. Nat. Hist. Vol. 6, p. 27 to 29, 40, 41; also Stodder, p. 369; also Amer. J. S. [2] Vol. 22, p. 296. H. D. Rogers, Geol. Pa. II, 816, fig. 590, under Boeck's name of *Par. spinosus* which see for figure. Ordway, Proc. B. N. H. 8, p. 1 to 5; Jackson, p. 58. Dana 1863, Manual Geol. 189, fig. 245.) Walcott, Bulletin No. 10, U. S. G. S. page 45, plate 7, fig. 3, a large flattened cheek (omitted); plate 8, fig. 1, 1 a, medium sized heads, natural

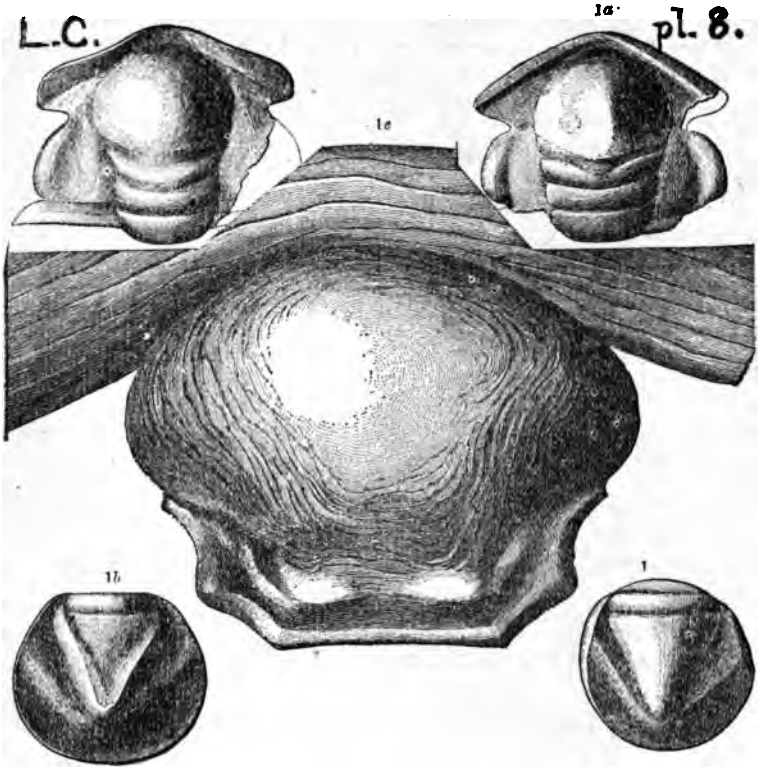


size. showing varieties of border; fig. 1 b, 1 c, broader and longer forms of tail piece; 1 e, large chin piece (hypostoma, attached to frontal doublure of head; plate 9, fine large specimen in Boston Soc. Nat. Hist. museum (omitted). Braintree formation. *Middle Cambrian. M. C.* —Note Thousands of specimens are supposed to have been dumped into Boston harbour in making Long Wharf. Green's original specimen had no known locality and was conjectured to be a European specimen accidentally mixed up with his American collection. Cashier Wentworth was the first to suspect that the forms might be trilobites; Charles T. Jackson the first to recognize them as Paradoxides; W. B. Rogers the first to visit the locality, collect and describe them at the next meeting of the society.

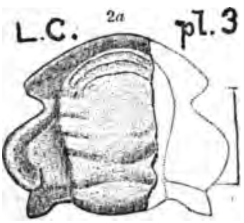


Paradoxides kjerulfi. Linnarsson; used by Walcott, in Bull. No. 30, U. S. G. S. page 178, plate 20, fig. 2, to explain a feature of the Rocky Mountain species *Paradoxides gilberti* (*M. C.* Middle Cambrian of Sweden) viz. the small round protuberance between the eyes and the glabella; a character observed by Ford in the young of *Olenellus asaphoides*. *P. gilberti* embryonic features last to an age long after they disappear in other species; normal individuals also

Paradoxides harlani, *on page 599 above.*



over-develop special features; one individual will develop the different features unequally; and peculiarities of youth only become in other species permanent specific characteristics. (See Walcott's four propositions, pp. 178, 179.)



Paradoxides lamellatus. Hartt. (Acad. Geol. 2d, Ed. p. 656.) Walcott, Bulletin 10, U. S. G. S. page 25, plate 3, fig. 2 a, type specimen, *enlarged twice.*—Saint John formation, Portland, N. Brunswick.—(*P. loricatus*, Matt. is a variety. Trans. R. S. Can., 1882, 105, pl. 9, f. 19.)—*Middle Cambrian.* *M. C.*

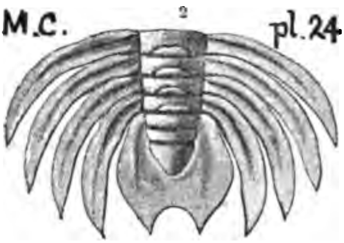
Paradoxides macrocephalus. See **Olenellus thompsoni.**

Paradoxides micmac, Hartt. Trans. R. S. Can. Vol. 2, 1868, page 101, *St. John group.* (S. A. Miller, 1889.)

Paradoxides(?)quadrispinosus. See **Bathynotus holopyga.**

Paradoxides regina, Matthew, Am. J. S. and A. Vol. 33, 1887. *St. John group.* (S. A. Miller.)

Parodoxides rugulosus. Corda; used by Walcott in Bull. 30, U. S. G. S. page 162, plate 24, fig. 2, (pygidium and four last thoracic segments, *enlarged* after Barrande, Syst. Sil. Boh. I, pl. 9, f. 31, 1831) to compare with **Mesonacis vermontana** of America, in Middle Cambrian.



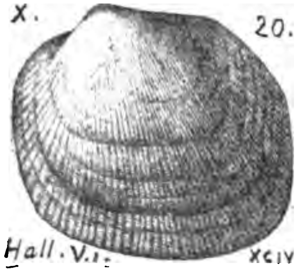
Paradoxides spinosus. See **Paradoxides harlani.** *M. C.*

Paradoxides thompsoni. See **Olenellus thompsoni.** *M. C.*

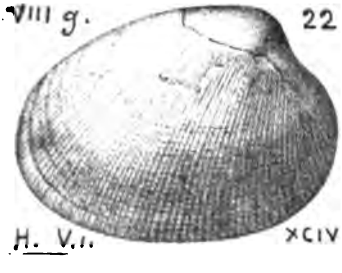
Paradoxides vermontana (and *vermonti*). See **Mesonacis vermontana.** *M. C.*

Paramylacris rotundum, Scudder. A hexapod insect from a Mazon Cr. nodule, Ill. Proc. Acad. N. S. Phila., 1885, p. 35. In the Lacoe Collection at Pittston, Pa. *Coal measures. XIII.*

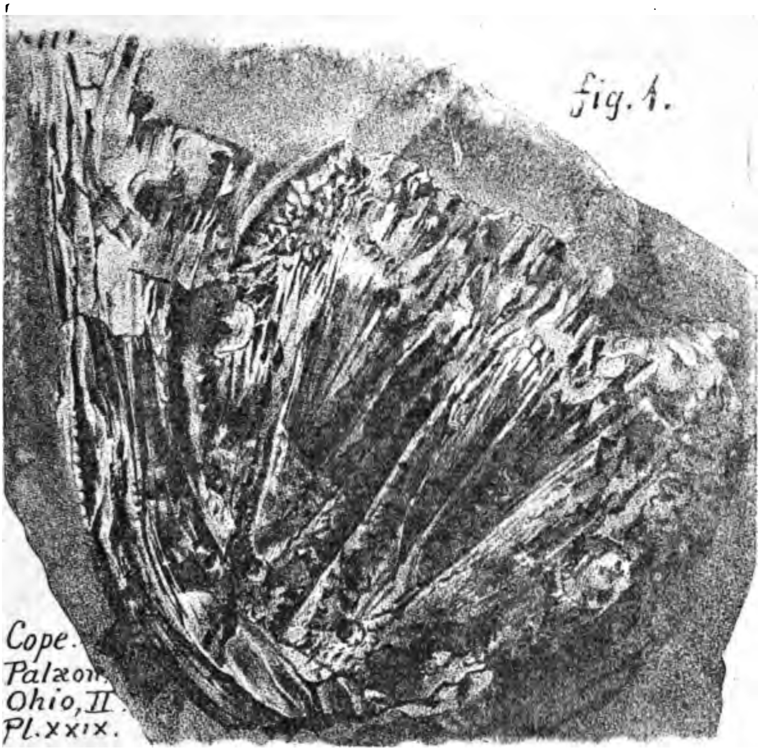
Pararca erecta, Hall. Palæontology of New York, Vol. 5, part 1, p. plate 94, fig. 20. *Waverly sandstone* (= *Pocono*, *No. X.*)—Recognized by Simpson in Randall's Collections at Warren, Pa., specimens 9543, 9544, 9546, wrongly labelled *Edmondia.*



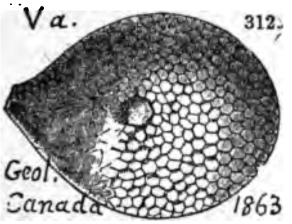
Pararca venusta, Hall. Palæont. New York, Vol. 5, part 1, page 431, plate 94, fig. 22. *Upper part of Chemung* at Warren, Pa., and at Panama, N. Y., above the Panama Conglomerate. (Hall.) See Cat. OOO, Randall's Collections at Warren, Pa., specimens 9545, 9547.—*VIII g.*


VIII g.
22
H. V.1.
XCIV

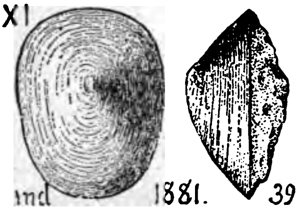
Pariostegus myops, Cope, Pal. Ohio, Vol. 2, *twice size.*



Pasceolus halli, Billings. Geology of Canada, page 309, fig. 312, from the *Anticosti group* (equivalent in age of the *Clinton formation*) in the Gulf of St. Lawrence. *V a.*



Patella levettei, Linnæus. (See **Lepetopsis levettei.** Whitfield, Bull. Amer. Mus. N. Y.) Collett's Indiana Report of 1881, page 359, plate 39, fig. 4, apex broken off (no hole); fig. 5, side view. Spergen Hill, Washington Co., Ind. *Warsaw limestone. XI.*

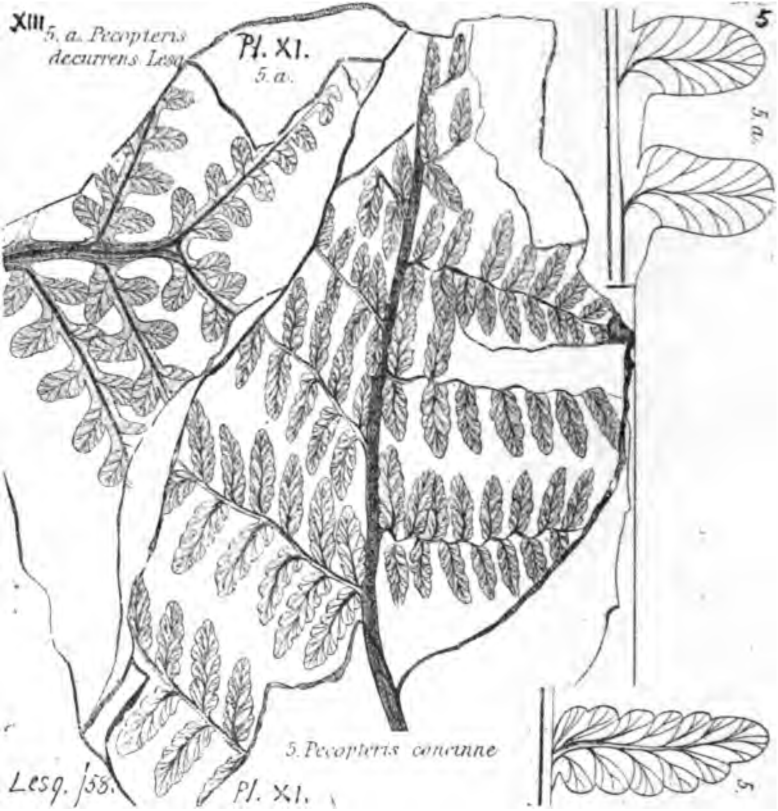


Pecopteris arborescens, Schlot. Lesq. Coal Flora, p. 230, pl. 41, figs. 6 to 7 *b*. Collected by White from base of the *Powelton shales* (over Cook bed) at Ocean mine and old mine near Barnett's Shoups Run, Broad Top, Huntingdon Co., Pa. T3, p. 62.

Pecopteris chærophylloides, Brgt. found at Darlington, Pa. *XIII.*

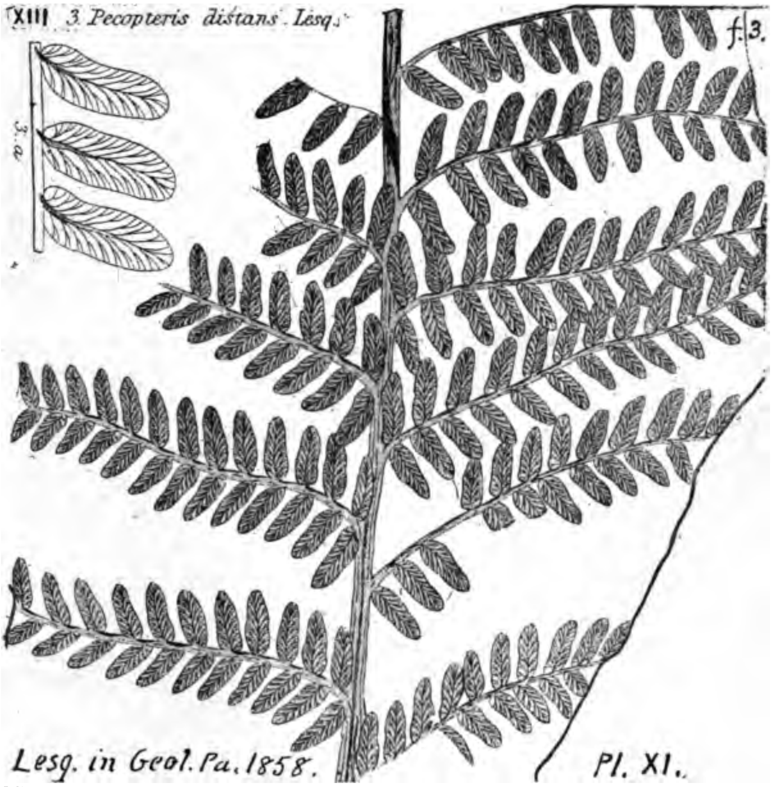
Pecopteris concinna. Lesq. Preoccupied by Presl. and identical with—

Pecopteris decurrens. Lesq. represented in Geol. Pa., 1858, page 867, plate XI, by fig. 5, and fig. 5 a, a slab of slate from the roof of the Gate Vein at Pottsville;—*P. concinna*, a fine species differing from *P. abbreviata* by leaflet, and from *P. angustissima* by nervation;—*P. decurrens*, a species so remarkable as to be valid for the type of a peculiar genus.

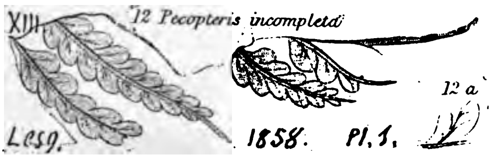


Lesquereux afterwards established it as *Pseudopecopteris* (*false Pecopteris*) *decurrens ;* Coal Flora, 1880, page 265. Tne specimen is unique; and "has no distinct relation to any other of the Coal Measures." (Lesq.)—*XIII.*

Pecopteris distans. Lesq. Geol. Sur. Pa., 1858, p. 866, pl. XI, fig. 3, 3 *a*; found with *P. polymorpha* at the anthracite Gate Vein at Pottsville, and differs from it only by its distant leaflets, etc. May perhaps be Bunbury's Nova Scotian *P. elliptica*, or a slight variety of it. Coal Flora, 1880, p. 246.—Shale of the Muddy Creek Coal west of Pottsville. *XIII.*



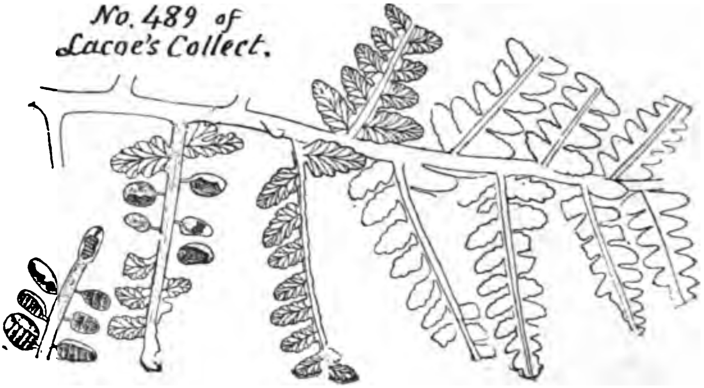
Pecopteris incompleta. Lesq. Geol. Pa., 1858, p. 868, pl. 1, fig. 12; Coal Flora, 1880, p. 264; an insignificant fragment from the anthracite Gate Vein at Potts-



ville, which receives importance from Röhl's fig. of *Sphenopteris coarctata*, which shows "the same prolongation of the rachis into a linear band taking the place of a terminal pinnule," etc. Lesq.—*XIII.*

Pecopteris inflata. In *Sharon Coal* bed roof shales, Q3, p. 53, 126, 160.—*XII.*

Pecopteris fontainei (*P. abbreviata*, Brongt.) G. B. Simpson's figure (1889) of Specimen No. 489 in M. Lacoe's collection at Pittston, Pa, a fragment of the plant with fructifications (*Sorocladus*) attached.



Pecopteris laciniatus. See **Pseudopecopteris muricatus.** *XIII.*

Pecopteris longifolia, Brongt. Lesq. Coal Flora, p. 226. Under Campbell's Ledge, Pittston Gap, Lack. Co., Pa. *Base or XII.*

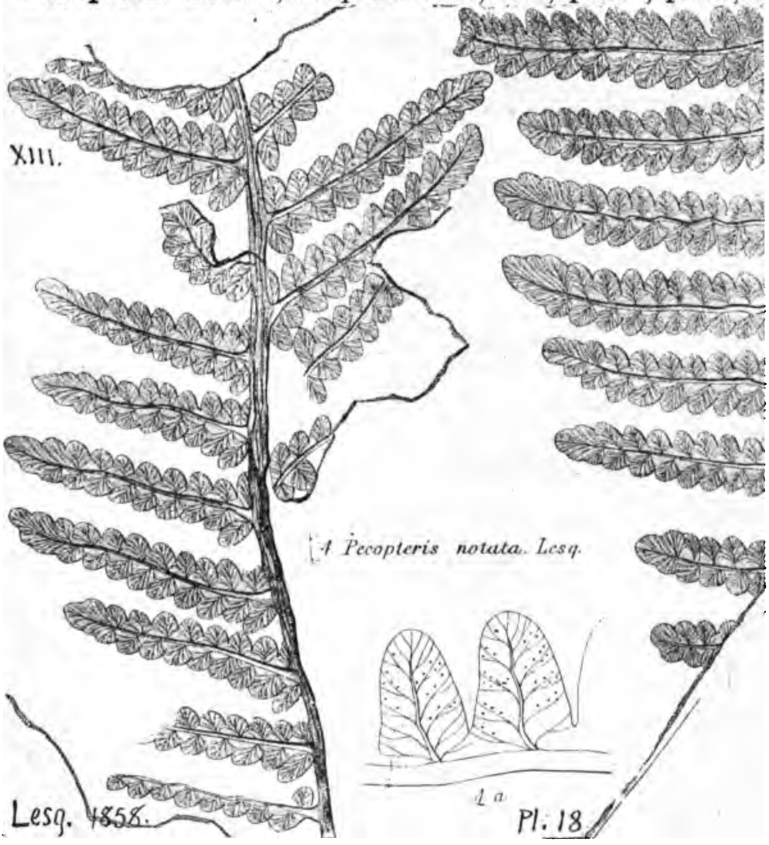
Pecopteris loschii, Brogt. Lesquereux says (Coal Flora, Report P, page 206, 1880) that he has never been able to see a fern of our Coal measures (in America) satisfactorily representing this species as described by Brogniart from specimens said to have been sent to him from Wilkes-Barre. In the Survey collections specimens C4–2 (three in number) are labelled *P. loschii.* They belong to I. C. White's collections on Muddy Creek, ½ m. from Cumberland, Greene Co., Pa., from the roof of the *Waynesburg coal bed*, *XV.* There are others, C4–7, C4–9, from the same, but not so labelled. Specimens C3–1 (four specimens) and C3–2 (a large leaf) from the same bed's roof, but several miles distant, are doubtful.

Pecopteris microphylla, at Darlington, Pa. *XIII.*

Pecopteris muricata. See **Pseudopecopteris muricatus.** *XIII.*

Pecopteris nervosa, Brgt. Reported from under *Tionesta sandstone*, Eckert's bridge, Lawrence Co., Pa. Q2, 85. Abundant in roof of Cook bed, Broad Top. T3, 278.—*XIII.*

Pecopteris newberryi. See **Pseudopecopteris newberryi.** *XIII.*



Pecopteris notata, Lesq. Geol. Pa., 1858, p. 866, pl. 18, f. 4, 4 *a*; Coal Flora, 1880, p. 262; with minute fruit-dots irregularly placed among the little nerves (nervules) between the branches; leaflets short and broad, covered with small dots, which if fruitage would place the plant in Göppert's European genus *Hemitelites.* Lesq.—*Gate Vein*, Pottsville. No other specimen at all like this one (now in the Mus. N. Hist. Boston) ever seen by Lesquereux.—*XIII.*

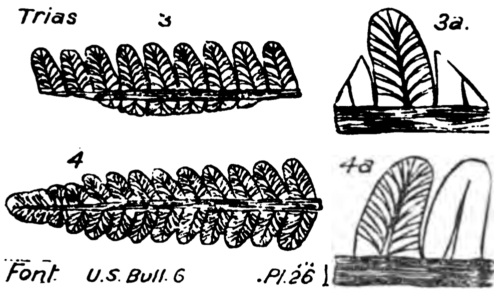
Pecopteris plumosa, Darlington bed. Q 54, 55.—*XIII.*

Pecopteris polymorpha. Q 54, 55.—*XIII.*

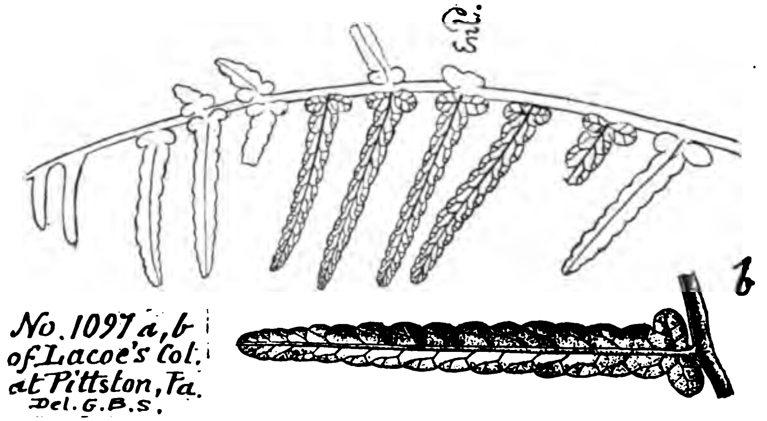
Pecopteris (*Alethopteris*) **pretiosa,** Hartt. Dawson's Acad Geol. 1868, p. 553, fig. 192 L (See figure under **P. serrulata** below.) *Upper Devonian* of St. John, N. B.—*VIII-IX.*

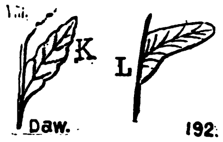
Pecopteris pusilla. See **Psendopecopteris pusilla.** *XIII.*

Pecopteris rarinervis, Fontaine. Monograph, U. S. Geol. Sur. Vol. 6, 1883, page 48, plate 26, fig. 3, ultimate pinna; 3 *a*, *magnified*; 4, summit of last pinna; 4 *a*, *magnified.* Only known by small fragments, found in the Aspinwall Shaft tip, and at Carbon Hill over the bottom coal, Richmond field, Va. So much like *Carboniferous* forms as to excite suspicion; undoubtedly *Mesozoic;* much like Heer's European *Asterocarpus meriani*, and *A. platyrachis;* but pinnules always separate down to base.—*Trias.*



Pecopteris resupinata, Lesq. G. B. Simpson's figures of specimen No. 1097 *a*, *natural size*, and *b*, *enlargement* of one leaflet, in Mr. Lacoe's Collection at Pittston, Pa., from Mazon Creek, Ill. *Coal meaeures.* *XIII.*

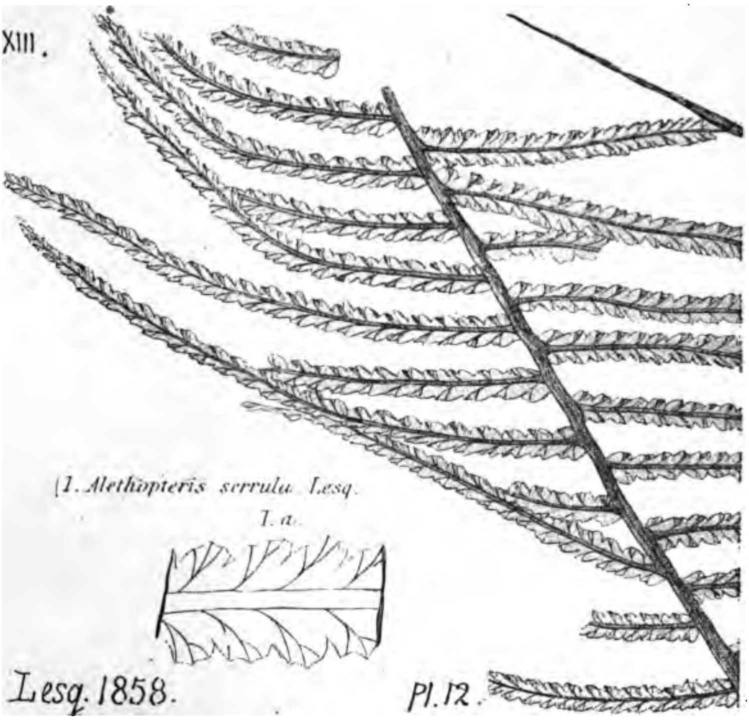




Pecopteris (*Alethopteris*) **serrulata.** Hartt. (*Neuropteris serrulata*, Daw.) Dawson's Acad. Geol. 1868, p. 553, fig. 192 K. It is not *P. serrula*, nor *P. serrata*. It resembles *P. plumosa*, Bgt. with specific differences. NOTE. Fig. 192 L is *P. pretiosa.*—*XIII.*

Pecopteris schimperi. (*Schimperiana.* Fontaine and White. Report PP, 1880, page 75, plate 24, figs. 1 to 5.)—XVII. Highest Coal measures of South Western Penna. and West Virginia; in the roof shales of the Waynesburg bed. NOTE. One of the most distinctive species of the formation; two varieties of form, fig. 4, and figs. 1, 2, 3, 5; nervation same in both; very like *Pecopteris sulziana* of Brogniart (Hist. V, F. 225, CV, 4) from the base of the *Trias.*—Fine specimens in Mr. Lacoe's cabinet from the Great Vein of the Hocking Valley, Ohio.

Pecopteris serrula. (*Alethopteris serrula*, Lesq. Geol. Pa.


XIII.
1. Alethopteris serrula Lesq.
1. a.
Lesq. 1858.
Pl. 12.

1858, plate 12, figs. 1, 1 *a*.) Lesq. Coal Flora, page 256. Remarkably like *Alethopteris erosa;* and close to *Pecopteris augustissima*, Brgt. Found in shale of old anthracite mine behind the hills east of Port Carbon, Schuylkill Co., Pa.—*XIII*. Also under Campbell's ledge, Pittston. *XII*.

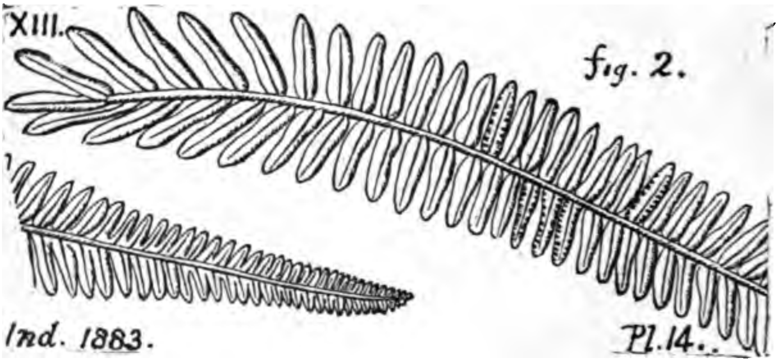
Pecopteris serlii. See **Alethopteris serlii**. *XIII*.

Pecopteris sillimani, Brgt. Darlington Coal, Q, p. 55.

Pecopteris solida. *See Appendix*.

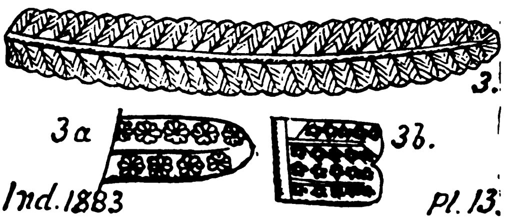
Pecopteris squamosa, Lesq. Coal Flora, p. 235, pl. 39, fig. 12 to 13 *a*. At Darlington, Pa., Q, 55.—*XIII*.

Pecopteris strongii. (Lesquereux, Coal Flora of Pa., 1880, page 236, plate 39, figs. 14 to 15 *a*. Illinois Rt. 4, plate 13, fig. 7 to 9. Only seen in Morris coal roof and Mazon creek nodules.) Collett's Indiana Rt. 1883, page 64, plate 14, fig. 2; remarkable for the great length of its feathery leaves, and which makes the leaflets distant from each other. *XIII*.



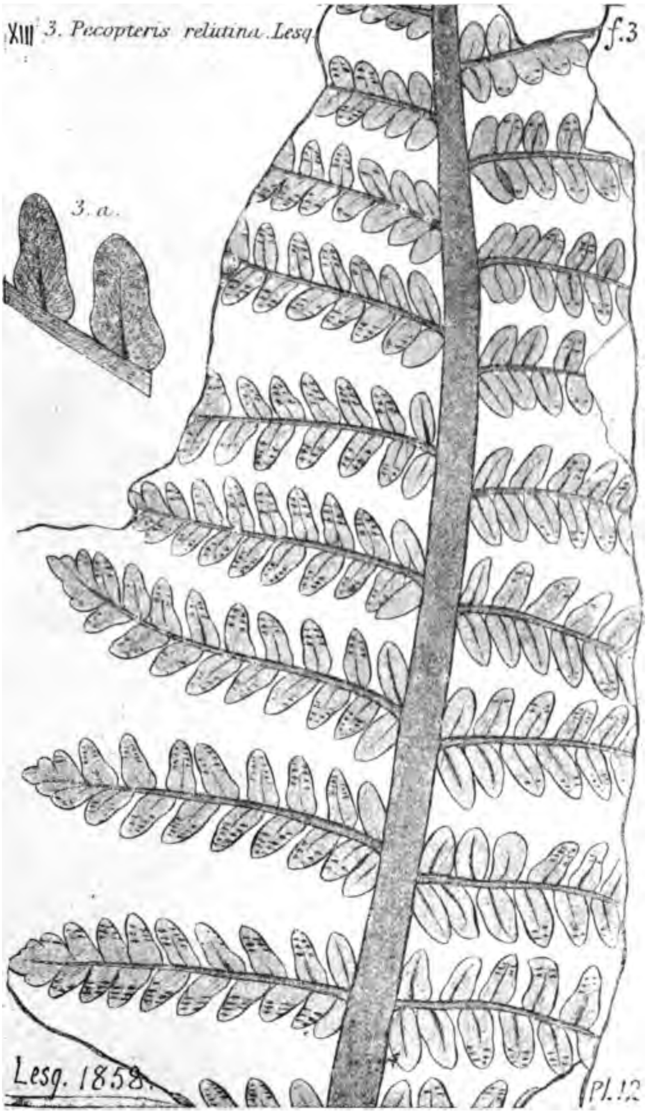
Pecopteris truncata, in Darlington bed, Q, 55, *XIII*.

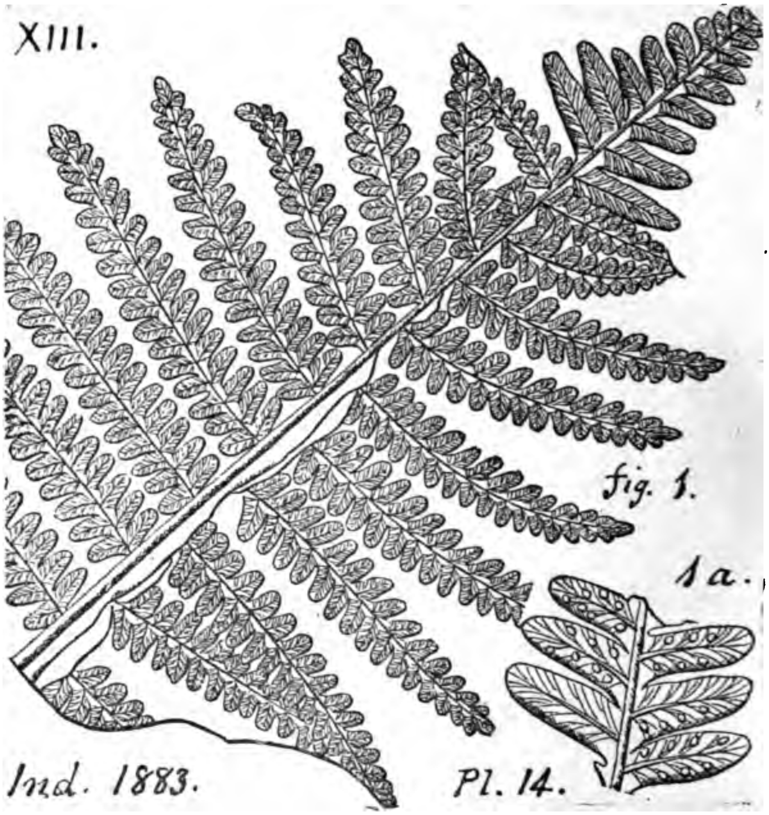
Pecopteris unita. Brongniart. (Lesquereux, Coal Flora of Penn. 1880, page 223, plate 40, figs. 1 to 7 *b*. — Geol. Penn, 1858, page 867. Illinois Rt. 2, page 442; Schimper; Brogniart Hist. V. F. plate 116. *Cyatheites unitus*, Geinitz, Verst. pl. 29.) Collett's Ind. 1883, plate 13, figs. 3, 3 *a*, *b*.—*XIII*. Abundant in some localities; beautiful specimens in Mazon creek ore balls (200 of them in



the Cambridge, Mass., museum; also the fine specimen found by Lesquereux in an old mine on Muddy Creek, Pottsville anthracite coal basin. Also in the Rhode Island coal measure; at Wilkesbarie; Pittston; Pottsville; but not at Cannelton.

Pecopteris velutina. Les. Geol. Pa. 1858, p. 866, pl. 12, fig. 3, 3*a;* from Johnstown, Cambria Co., Pa., venation not visible under the thick skin; but in a specimen afterwards obtained at Cannelton, Beaver Co., Pa., also with a thick shining skin some of the leaflets show the style of venation. Lesq.—Kittanning coal. *XIII.*




XIII.
fig. 1.
1a.
Ind. 1883.
Pl. 14.

Pecopteris vestita. Lesquereux. Coal Flora of Pa. 1880, p. 252, plate 43, 1 to 7 *a*. Very near *Sphenopteris integra* of Europe, Andræ, in Germ. Verst. pl. 28. Morris Coal shale, Ill. Collett's Ind. Rt. 1883, page 65, plate 14, fig. 1. *XIII.*

Pecopteris villosa, Brongt. Doubtfully identified by Lesquereux (p. 255) is a form plentiful at some places in America: e. g. a collection at Pittston, Luzerne Co., Pa., is composed almost wholly of specimens in indefinite numbers; found in Mazon Creek nodules, Ill.; recognized by Lacoe in Koch's collections at Tipton Run mines, Blair Co., Pa., July, 1889, in a bed assigned by me to the *Pocono formation*, *X.* "Generally found in the *Lower Coal measures.*" (Lesq.) *XIII.*

Pecopteris leaves, over Limestone No. 10 (of Stevenson's series) in Upper Barrens of Greene Co. K, 164.—*XVI.*

Pecopteris ——— ? Over Waynesburg Coal. K, 59.—*XV.*

Pecopteris ——— ? A beautiful fruiting fern of this genus crowds Cook (Fulton) roof shales of Ocean mine tunnel, Broad Top, Huntingdon Co. T3, 319.—*XIII.*

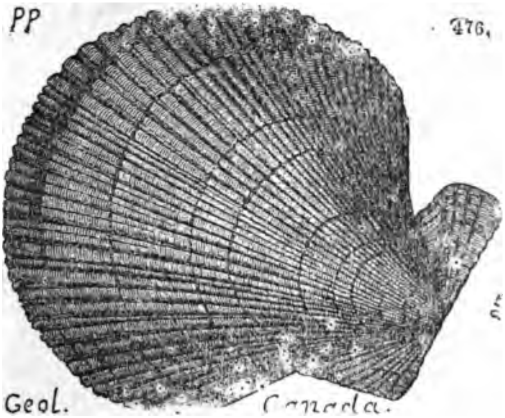
Pecten aviculatus. See **Entolium aviculatum.** *XIII.*

Pecten broadheadi. See **Aviculopecten carboniferus.**

Pecten carboniferus. See **Aviculopecten carboniferus.**

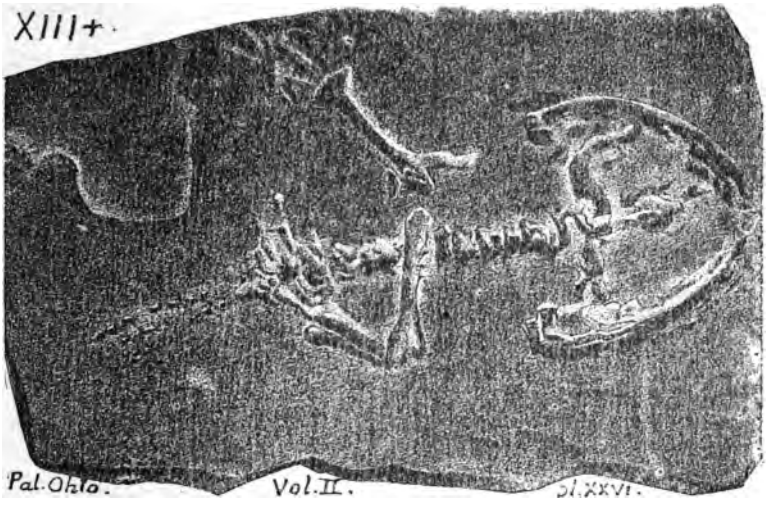
Pecten hawni. See **Aviculopecten carboniferus.** *XIII.*

Pecten islandicus, Muller. Geology of Canada, 1863, page 963, fig. 476; one of the Arctic shells left in the *Post glacial* (*Champlain*) *clay*, in the valley of the St. Lawrence; but not as yet found in the Delaware and Susquehanna river clays of the same age.—*Quarternary*, (*Post Glacial*,) *PP.*



Pecten providencensis. See **Aviculopecten prov.** *XIII.*

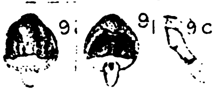
Pelion lyelli, (*Ranices lyelli*, Wyman, Amer. Jour. Sci.

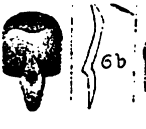


1858.) Cope, in Pal. Ohio, Vol. 2, 1875, page 390, plate 26, fig. 1, *natural size*, original specimen of the reptile, as yet the only one of this type known; differing from *Amphibamus grandiceps*, Cope. in its relatively larger limbs, especially the hinder limbs.—*Coal measures*, *XIII?*

Peltodus plicomphalus, St. John and Worthen Geo. Sur. Ill., Vol. 6, 1875, page 411, plate 13, figs. 9 *a*, concave face of the fish tooth, bottom edge imperfect; *b*, convex face, root restored in outline; *c*, profile section. Chester, Ill. *XI.*

XI. Peltodus? plicomphalus. St.J.&W. Geol. Illin. Vol. VI. Plate 13.



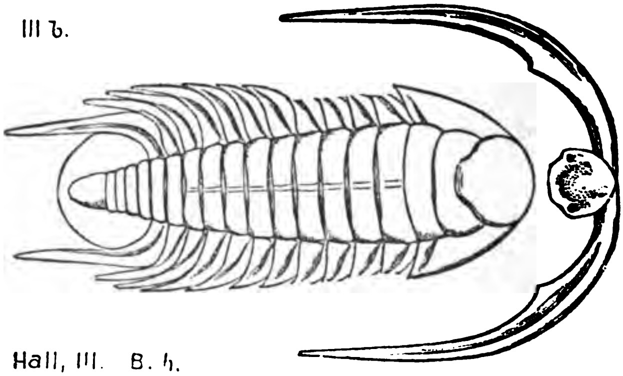


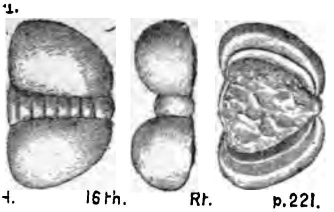
Peltodus quadratus, (*Figures under P. plicomphalus.*) St. John and Worthen Geo. Sur. Ill., Vol. 6, 1875, page 410, plate 13, figs. 6 *a*. *enlarged twice*, convex face of perfect fish-tooth; *b*, profile section; 7 *a*, concave face of imperfect tooth; *b*, convex face; *c*, section. Alton, Ill., *St. Louis* (*Sub-carb.*) *limestone*. *XI.*

Peltodus transversus, St. John and Worthen Geo. Sur. Ill., Vol. 6, 1875, page 412, plate 13, fig. 8 *a*, *enlarged two diameters*, convex face of a nearly perfect specimen of this fish-tooth; *b*, profile section, Carlinville, Ill. *Coal measures*. *XIII.*

XIII. Geol. Ill. Vol. VI. Plate 13.

Peltura holopyga. (Now **Bathynotus holopyga.**) Hall, Pal. N. Y. p. 529, wood cut. From Hudson river shales.—*IIIb.*

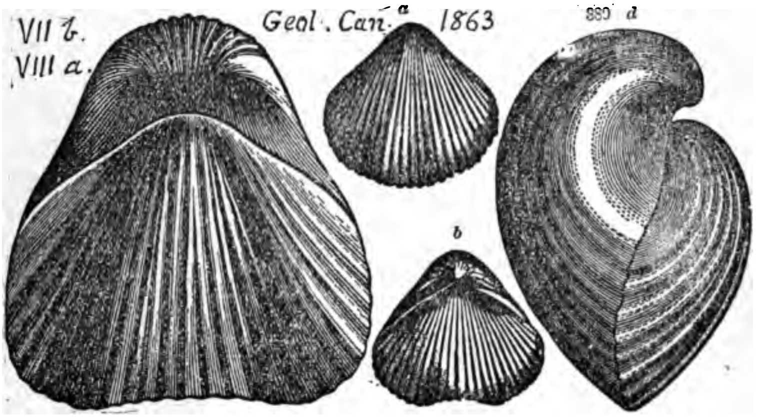

III b.
Hall, III. B. h.



Pemphigaspis bullata. (Hall, 16th An. Rt. N. Y. State Cab. p. 221.) Walcott, Bull. 30, p. 154, remarks that if this be a species of *Microdiscus*, it is the only one known from the Upper Cambrian (*Potsdam*) formation. NOTE. If so, all the *Microdisci* become *Pemphigaspes*; for, Emmons' original *Microdiscus* was a *Trinucleus*. (W.)

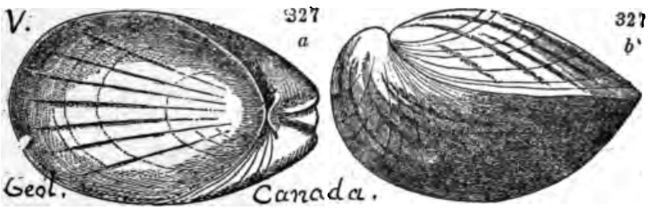
Pentacrinites hamptoni. See **Crinoid.** *III b.*

Pentamerella arata (*Pentamerus aratus*; *Atrypa arata*; *Atrypa octocostata*; Conrad, An. Rt. N. Y. 1841.) Hall, Pal. N. Y., Vol. 4, 1867. Figure taken from Geol. Canada, 1863, page 370, fig. 389, a, b, ventral and dorsal valves of a small specimen; c, d, dorsal and side views of a large one.—*Schoharie grit* and *Upper Helderberg*. *VII b*, *VIII a*.

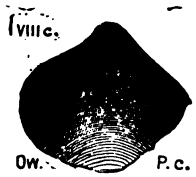


Pentamerella micula, Hall, Pal. N. Y., Vol. 4, 1867, Hamilton. Found in Pennsylvania, Blair Co. Bell's Mills, collections, Spec. 805–15, in *Hamilton shale*. *VIII c.*

Pentamerus barrandi, Billings. Canada Rt. of Pros., 1857, Geol. Can. 1863, page 316, f. 327 *a*, *b*. *IV-V.*

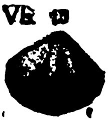


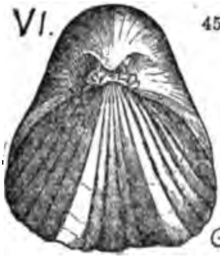
Pentamerus comis. *Atrypa comis*, Owen, Geol. Wisc., Iowa and Minn., 1852, plate 3 A, fig. 4; a smooth species from the limestone of the Upper Rapids of the Mississippi river. Devonian age.—*VIII.*

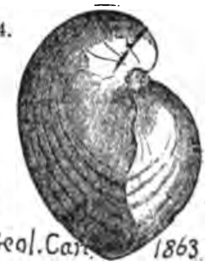


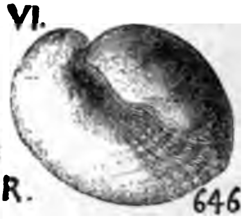
Pentamerus elongatus. See **Amphigenia elongata.** *VIII a.*

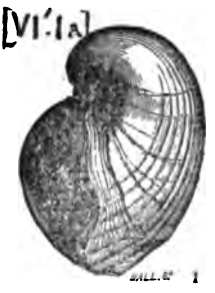
Pentamerus fornicatus, *Var.* Hall. Trans Alb. Inst., Vol. 10, 1879. Pal. N. Y., Vol. 2, pl. 24, f. 7, in Collett's Indiana Report of 1881, page 299, plate 27, fig. 15, view of the only specimen observed, in the *Niagara formation;* closely resembling the *P. fornicatus*, of the *Clinton formation.*—*V a*, *V b.*

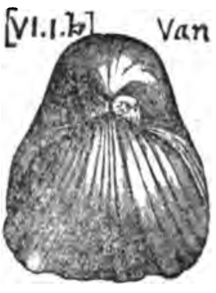










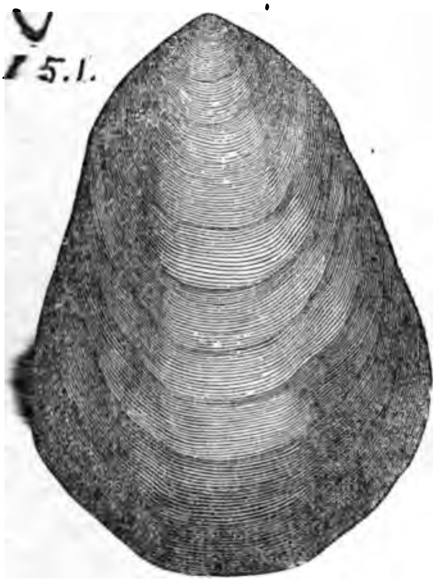


Pentamerus galeatus, Dalman. (*Atrypa galeata.*) Hall, plate figure [27, 1.] Vanuxem, page 117, f. 25, 1. Rogers, page 825, fig. 646. Lower Helderberg formation. (Dalman, Vet. Acad. Handlung, 1827.) Fig. 454 in Geology of Canada, 1863, gives a better side view, and is therefore inserted here.—In Pennsylvania it has been found at Orbisonia, Huntingdon Co. Specimen 602–2; 605–1 (interiors); on the Hog-back, Monroe Co. Spec. 608–8; below Shawnee, 609–1 (two large blocks containing many individuals and three smaller blocks); at A. B. Miller's farm, Warrior ridge, Barree township, Hunt. Co. Spec. 610–7 (two); all from *Lower Helderberg limestone* (*VI.*) over the *Waterlime*, T3, 126. Abundant in lower beds of *VI.* T, 41.—Spec. 702–16, is labelled from the *lime-sand* (*Oriskany*, *VII*) at the south end of Royer's ridge, Orbisonia. Spec. 702–11, is perhaps this species, from the same place.—In Monroe Co. Pa. abounds in the limestone partings of the *Stormville conglomerate*, and in the *Stormville limestone*. G6, p. 133, 134, 219, 241, 246, 279.— *VI.*

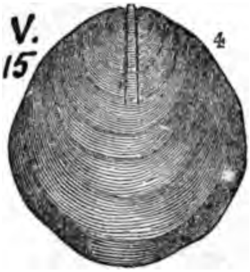
Pentemerus (*Atrypa*) *linguiferus.* (English fossil.) See **Atrypa naviformis** (Hall.) *V a.*

Pentamerus oblongus, Sowerby. Hall's Rt. on 4th District of New York, 1843, page 70, figs. 15, 1, 2, 3; 15, 4, cast of upper valve; 15, 5, cast of lower valve. Geology of Canada, 1863, page 316, fig. 326. *Clinton* and *Niagara.* *V a, b.*

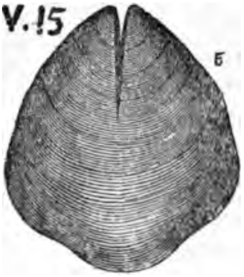
V 15.1



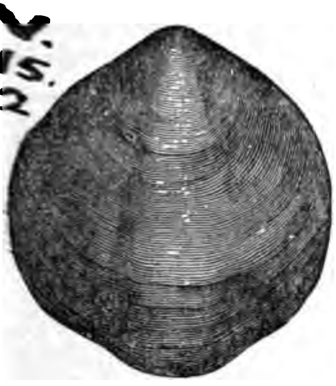
V. 15



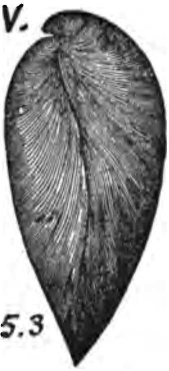
V. 15



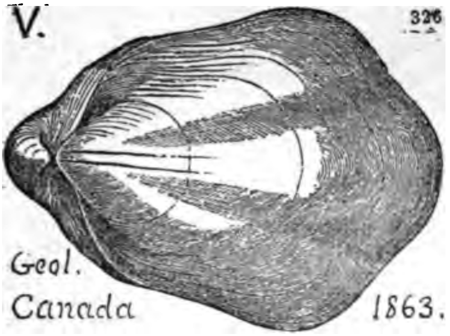
V. 15. 2

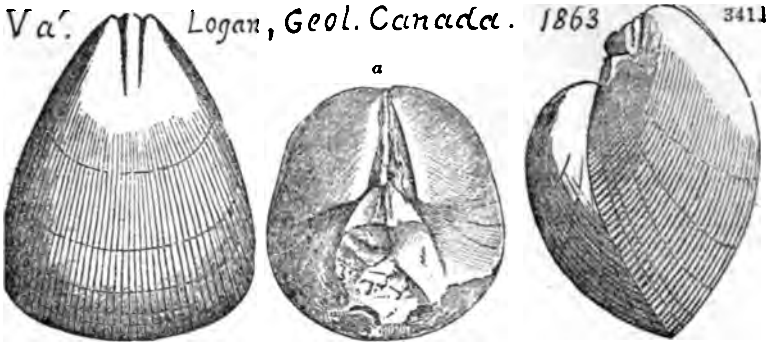


V.

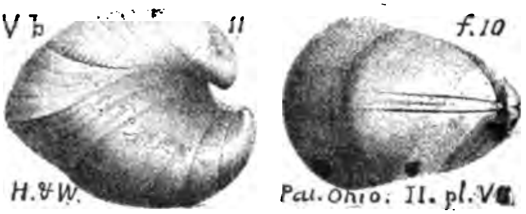


15.3





Pentamerus occidentalis, Hall. Geol. Canada, 1863, page 337, fig. 341 *a*, ventral valve; *b*, impression of beak of ventral valve; *c*, side view. *Guelph formation* (between *Clinton* and *Niagara*), *V a'*.

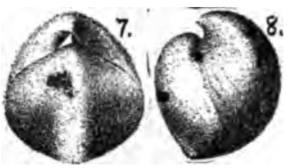

V b
11
f.10
H.&W.
Pal. Ohio. II. pl. VII

Pentamerus pergibbosus, H. & Whitf. Pal. Ohio, Vol. 2, 1875, page 139, plate 7, fig. 10, back of internal cast, from *Niagara limestone*, Greenville, Ohio, showing the unusual length of the shell; 11, profile of another, showing depth of valves.— *V b.*

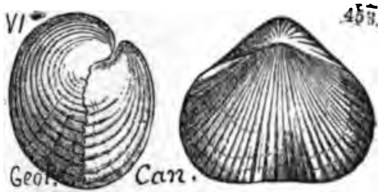
Pentamerus pseudogaleatus, Hall, Pal. N. Y. vol. 3, 1859 Low. Held. is perhaps represented by four very poor specimens 601–11, in the Orbisonia collections, 1½ miles south of Roc Hill furnace. *Low. Held.*, *VI.*—Abundant in *Stormville co glomerate limestone beds* at Stormville, Monroe Co., Pa., G

279. *VI.*—In Bedford county it inhabits the upper part of the formation; T2, p. 88. Sections of the shell were seen in bed No. 44 of the Hindman section, on Will's Creek, 85′ beneath the *Oriskany sandstone*, T2, p. 104; and on weathered surfaces of the *Chert beds* near New Paris, T2, p. 121; also east of the Lutheran Church, Imlentown road, T2, p. 156.—*VI.*

Pentamerus ventricosus, Hall, Wisconsin Rpt., 1861. *Niagara.*—Pal. Ohio, Vol. 2, 1875, page 138, plate 7, figs. 7, 8, back and profile views of an internal cast from Yellow Springs, Ohio, showing the usual features.—*V b.*

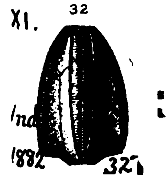


Pentamerus verneuili, Hall. See **Anastrophia verneuili**, Hall, Pal. N. Y. Vol. 4, 1867. Figure here given borrowed from Geol. Canada, 1863, p. 958, fig. 453, *a* back; *b* side view. *Lower Helderberg. VI.*



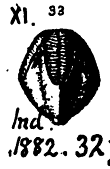
Pentamerus——— ? Casts of specular ore in Bortz's *Frankstown fossil block ore* bed, on fork of Piney ridge, between Wills and Evitts mountains, Bedford Co., Pa. T2, 138.—*V a.*

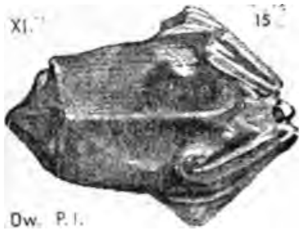
Pentremites concoideus. Hall, Trans. Alb. Inst. Vol. 4, 1856; Iowa Report 1858, plate 22, figs. 8, 9, 10.—Whitfield, Bull. 3, Am. Mus. Nat. Hist. N. Y., 1882, page 44, plate 9, fig. 32, in Collett's Indiana Rt. 1882, page 323, plate 32, fig. 32, *natural size*, side view.—*Sub-carboniferous limestone*, Spergen Hill, etc. Ind. *XI.*



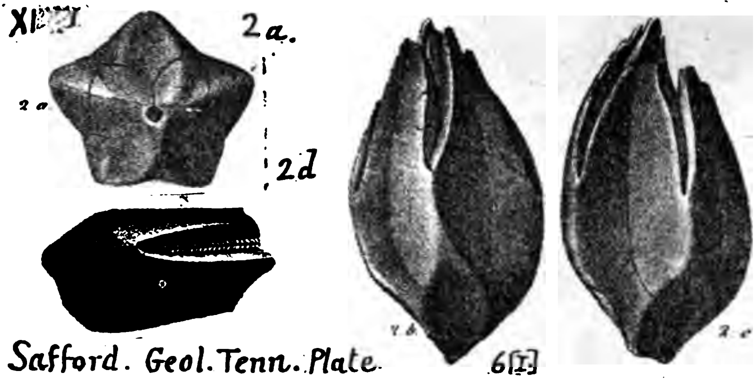
Pentremites godoni, reported by C. E. Hall, in collections from Pennsylvania Coal measures. *XIV?*

Pentremites koninckana. Hall, Trans. Alb. Inst. Vol. 4, 1856; Iowa Report, 1858, p. 656, plate 22, fig. 11,—Whitfield, Bull. 3, Am. Mus. 1882, plate 9, fig. 33. Collett's Indiana Rt. 1882, page 322, plate 32, fig. 33, *magnified twice*, one of the type specimens; resembles the Belgian *Pentremites caryophyllatus* of De Koninck. Alton, Ill.; Spergen Hill, etc. Ind.—*Sub-carboniferous. XI.*





Pentremites (*obliquatus?*) **laterniformis**, Owen and Shumard Jour. Acad. Nat. Sci. 2d Series, Vol. 2, 1850. Geol. Wisconsin, 1852, plate 5 A, fig. 15, Randolph Co., Ill., Mill creek. *Carb. lime.* (*Pentremites obliquatus*, Roemer) Safford. Geol Tenn. 1869, page 346, plate 6 (I) figs. 2 *a*, to 2 *d*. Its place is given (on p. 345) at Clarksville, Tenn., in beds (3), 48′ thick, in the middle of the L. Carb. or *Mountain limestone*, with *Archæocidaris*, and *Melonites multipora*. *XI.*



Safford. Geol. Tenn. Plate 6[I]

Pentremites obesus, Lyon, Geol. Sur. Ky., Vol. 3, 1857, page 469, plate 2, fig. 1, base; 1 *a*, summit; 1 *b*, profile; 1 *c*, basal pieces; 1 *d*, fragments showing the interradial pieces; 1 *e*, generic figure, ½ ×, 1. Basal pieces. 2. First radial pieces. 3. second radical pieces. 4. Third radial pieces. 5. Interradial pieces. 6. Pseudambulacral fields. This beautiful crinoid is only found (1857) in a six foot layer of limey shale in the lower 60′ of the shale division (which is 150′ thick)· in the middle of the Millstone Grit formation of West Kentucky, and 200′ above its base, Crittenden Co. That would correspond to our *Mercer limestones*. *XII.—For figure see p. 621.*

Pentremites pyriformis, Say. Jour. Acad. Nat. Sci. Phila. Vol. 4, 1825. *Kaskaskia limestone*. Recognized by I. C. White in the *Ferriferous limestone* of the *Allegheny Coal series*, in Lawrence Co., Green's quarries, Taylor, Q2, 47, 142; also in Mercer Co., Q3, 25.—*XIII.*

(**Pentremites obesus.** *See p. 620.*)

XII *Fig. 1.*

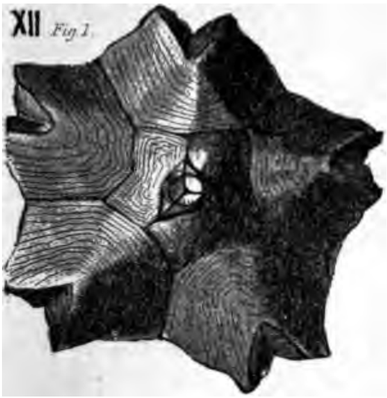


Fig. 1a

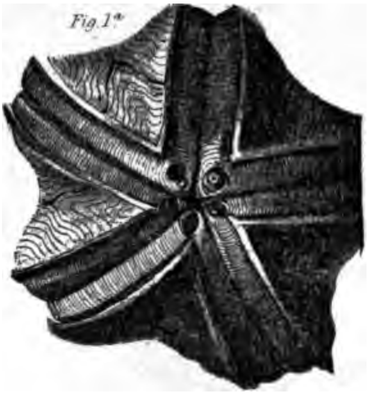
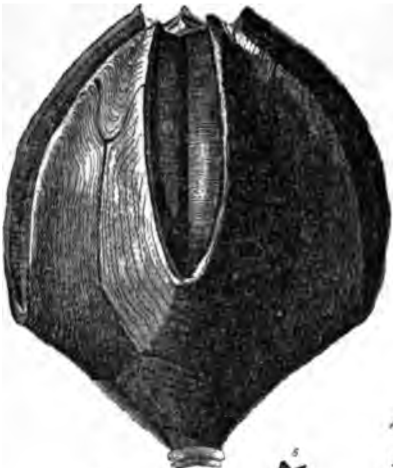


Fig. 1b



..1c

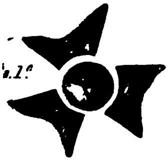


Fig. 1d

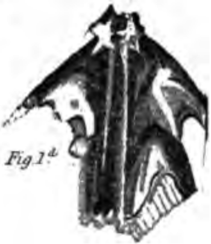
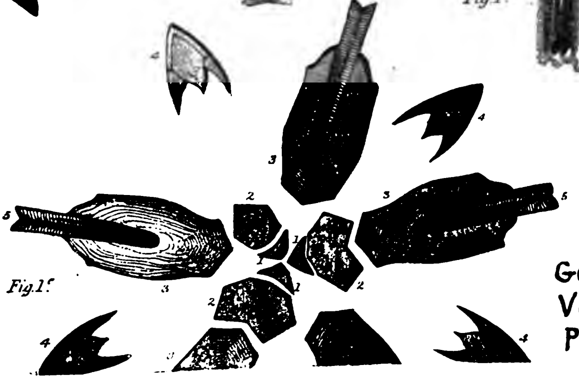


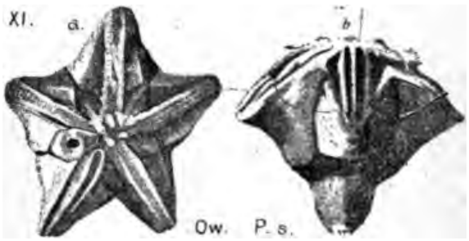
Fig. 1e



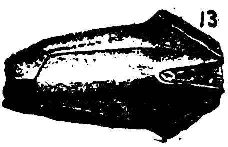
Lyon.

Geol. Ky.
Vol. 3,
Plate 2.

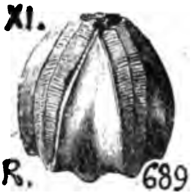
Pentremites (now *Codinites*) **stelliformis.** Owen and Shumard, Geol. Wis. Iowa and Minn. pl. 5 A, fig. 16, from the *Burlington limestone* of Iowa.—*XI.*



Pentremites subcylindrica, Hall and Whitfield. Pal. Ohio, Vol. 2, 1875, page 129, plate 6, fig 13, showing the ambulacral areas, radial plates, and tops of the basal plates. *Niagara formation, V b.*

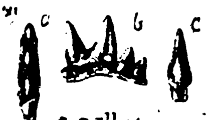


Pentremites ———. Rogers, page 832, fig. 688. *Mountain limestone* in the Mauch Chunk red shale formation. (The cup of a stone lily broken from its stem.) *XI.*

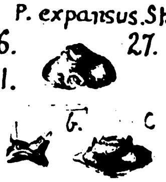


Peplorhina anthracina, Cope. Proc. Acad. Nat. Sci. Phila. 1873. Pal. Ohio, Vol. 2, 1875, page 410, plate 35, fig. 6, plate 41, figs. 4, 5, 6 (6 not on this plate), plate 35, fig. 6, *nat. size,* a cranium seen from below displaying mandibles, hyoid bone, operculum, etc.; plate 41, fig. 4, dislocated cranium from below; above, vomerine teeth; behind, separated cranial bones; to the right of middle an operculum; fig. 5, superior cranial bones.—Newberry says that this fossil animal of the Ohio *Coal Measures* is *not a fish,* but an *Amphibian.*—*XIII.*

Periplectrodus compressus, St. John & Worthen Geo.

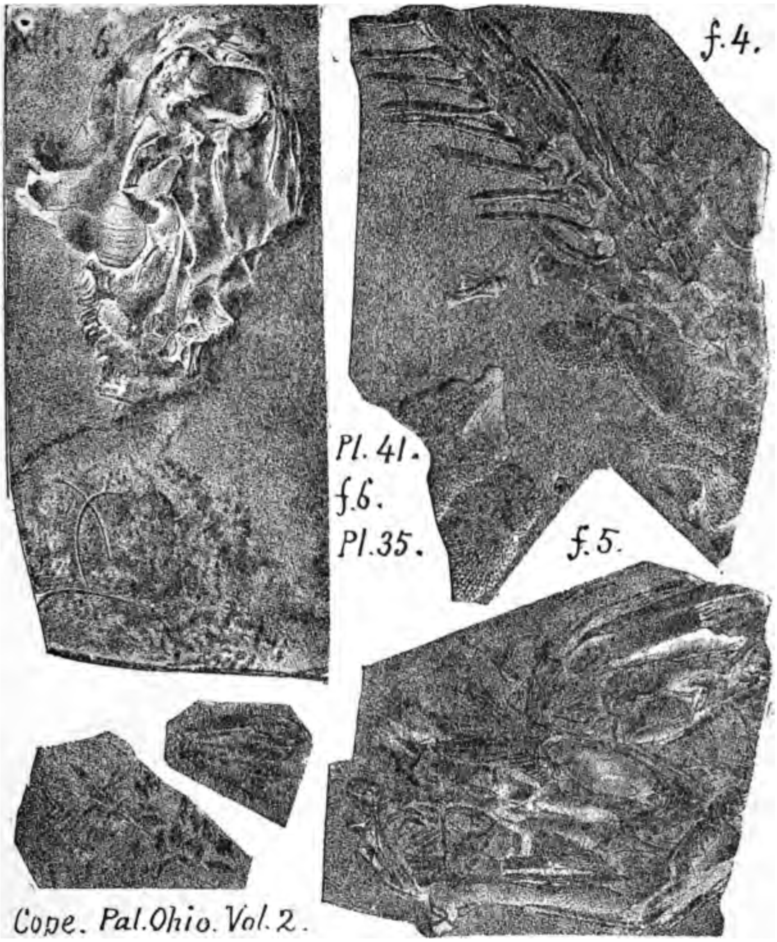


G.S.Ill.Vol.VI,pl.8.
Periplectrodus compressus StJ.+W.



Periplectrodus warreni, StJ.

Peplorhina anthracina, *Cope. See p. 622.*



(*Continuatiou of Periplectrodus compressus.*)

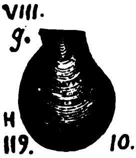
Sur. Ill., Vol. 6, 1875, page 326, plate 8, figs. 26 *a*, to *c*. From Upper beds of *St. Louis* (*Sub-carb.*) *limestone.* Alton, Ill.—*XI.*

Periplectrodus expansus, (*Figure* given ander *P. compressus*). St. John & Worthen Geo. Sur. Ill., Vol. 6, 1875, page 327, plate 8, figs. 27 *a* to *c*, of a unique example of perfect fish-tooth, except that the middle crown cusp is broken off; from Chester, Ill. in the *Chester* (*Sub-carb.*) *limestone. XI.*

Periplectrodus warreni. (*Figures* under *P. compressus.*) St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 325, plate 8, figs. 25 *a*, to *c*; the last a mature specimen of this species of fish-tooth, showing at least seven transverse series of crown-cusps, with fine cutting edges, and ornamented on both faces, much as in *Cladodus*. A score of such have been found, of various ages, and a great variety in number of sets of cusps, showing that old ones may have up to twelve. From the Illinois *Burlington* (*Sub-carb.*) *limestone*. *XI.*

Pernopecten crenulatus. (*Pecten crenulatus.*) Hall, Geology of the Fourth District of New York, 1843, page 264, fig. 119,8. *Chemung formation. VIII g.*

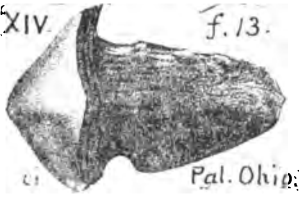
Pernopecten glaber. (*Lima glaber.*) Hall, page 264, fig. 119,10. *Chemung formation. VIII g.*

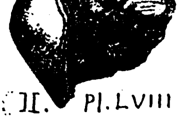


Pernopecten obsoletus. (*Lima obsoleta.*) Hall, page 264, fig. 119,11. *Chemung formation. VIII g.*

Pernopecten shumardianus (*Entolium shumardianum*, Winchell. Proc. Acad. Nat. Sci. Philada., 1865).—Pal. Ohio, Vol. 2, 1875, page 292, plate 15, fig. 4 *a*, *b*. *Waverly formation*, *X*.

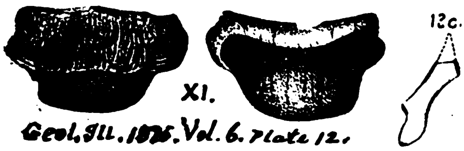
Petalodus alleghaniensis, Leidy. Journal Acad. N. S. Phila. [2] Vol. 3, 1856. —Pal. Ohio, Vol. 2, 1875, page 52, plate 58, fig. 13 *a*, front face of average specimen; 13 *a*, front face of small



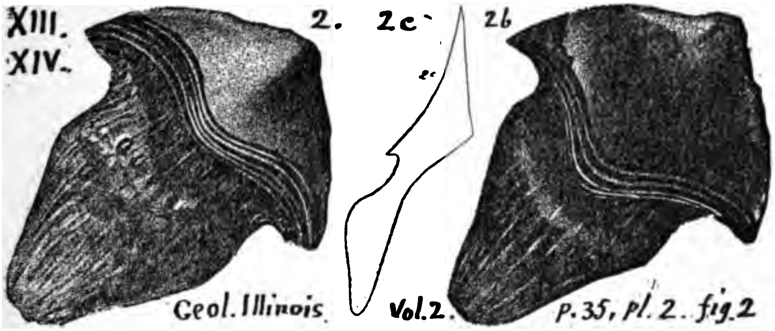


tooth, of this powerful fish first found in the *Coal measure limestones* of Pennsylvania. The *Crinoidal limestone* of the *Barren measures* (*Pittsburgh series*) is so full of sharks' teeth in Ohio as to deserve the name of a "fish bed." Most of them are small, the species are of *Petalodus*, *Cladodus*, and *Ctenoptychius*. The largest and most abundant is this *P. alleghaninsis*, which St. John considers to be the same as *P. destructor* of Illinois, but Newberry does not, because of its being always smaller, and having a longer and narrower fang, while the *destructor* fang is broad, flat and pointed.—*XIV.*

Petalodus curtus, Newberry & Worthen. Geo. Sur. Illinois, Vol. 2, 1866, page 394, plate 12, fig. 12 *a*, convex face of medium-sized tooth; crest worn nearly plane, with convex basal margin; 12 *b*, concave face, showing corrugated ornamentation; 12 *c*, profile section. *Keokuk limestone*, Bentonsport, Iowa. *XI.*



Petalodus destructor. Newberry & Worthen. Geo. Illinois, Pal. Vol. 2, 1866, page 35, plate 2, fig. 2, front, and 2 *a*, back views of crown faces of a specimen of this powerful fish's tooth; 2 *c*, a profile section of the same. (Figs. 1, 1 *a*, 2 *b*, and 3, omitted. Zittel has copied it in his Handbuch, Vol. 3, p. 97, fig. 108, half size.) *Low. Carboniferous.*—In Pennsylvania reported in the



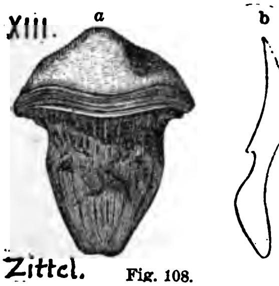
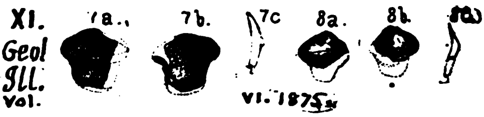


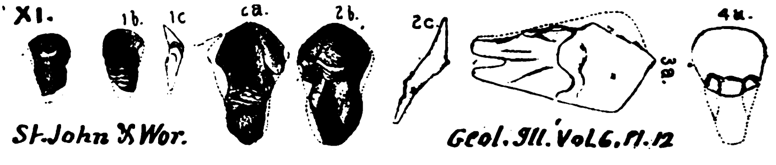
Fig. 108.

Fossiliferous limestone (250′ beneath Pittsburgh Coal) in Fayette Co. L, p. 36. *Barren measures. XIV.*

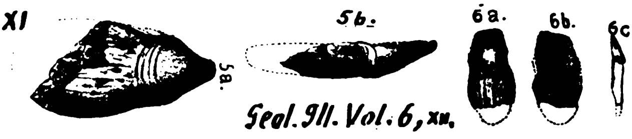
Petalorhynchus distortus. N. & W. Geol. Ill. Vol. 6, 1875, page 406, plate 12, fig. 7 *a*, convex face of medium sized fish-tooth; *b*, concave face showing deeply arched basal margin; *c*, profile section; 8, *a*, *b*, *c*, a smaller specimen. *St. Louis limestone beds. XI.*



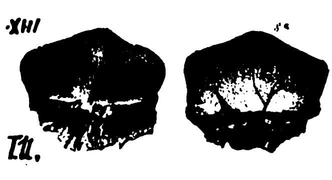
Petalorhynchus pseudosagittatus, St. John, and Worthen, Pal. Illinois, Vol. 6, page 405, plate 12, figs. 1 *a*, *b*, *c*, small fish-tooth, convex, concave faces, section; *a*, *b*, *c*, large tooth, ditto; 3 *a*, outline of convex face of very large pointed tooth, with forked root; 4 *a*, medium tooth. *St. Louis. XI.*



Petalorhynchus spatulatus, St. John and Worthen, Geol. Illinois, Vol. 6, 1875, page 408, plate 12, fig. 5 *a*, convex side of large swollen fish-tooth with swollen point; *b*, side view, 6 *a*, convex face, *b*, concave face, *c*, profile section, of small tooth. *St. Louis limestone, XI.*



Petalorhynchus (*Petalodus*) **striatus,** New. and Worthen, Geol. Sur. Illinois, Vol. 2, 1866, page 40, plate 2, fig. 8, back view; 8 *a*, front view, *natural size*, of this unique and pretty species, resembling distantly *P. sagittatus*, Agassiz. *Burlington. XI.*

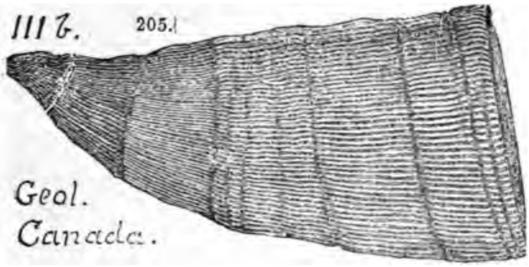


Petrablattina æqua, Scudder. A hexopod insect from near Fairplay Colorado. Proc. Acad. N. S. Phil., 1885, p. 38 —*Trias.*

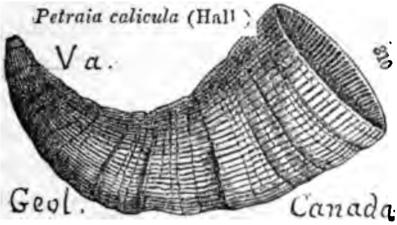
Petrablattina meyeri, Scudder. Ditto p. 38. *Trias.*

Petrablattina sepulta, Scudder. (*Blattina sepulta*, Scud. Proc. A. A. A. S. XXIV B, 1876, 110, 111, fig. 2.) Mem. Bost. S. N. H. Vol. 3, 1879, p. 125, 126, pl. 6, fig. 7. A cockroach from Cossitt's coal pit, near Sydney, Cape Breton, N. S. *Lower Carboniferous. XIII?*

Petraia canadensis, Billings, Geology of Canada, 1863, page 308, fig. 311. From the *Anticosti group* (*Clinton formation*) in Eastern Canada. *V a.*



Petraia calicula, Hall, Geol. Canada, 1863, page 308, fig. 310, from the *Anticosti* (*Clinton*) group of beds in the Lower St. Lawrence. *V a.*

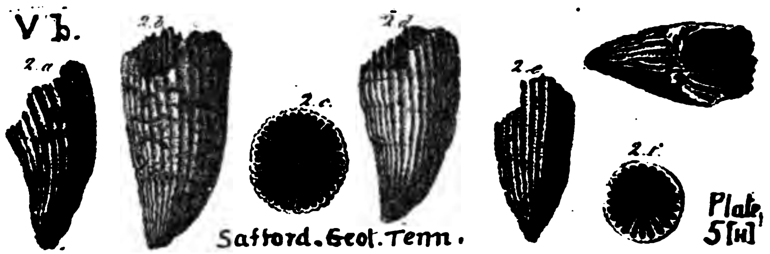


Petraia (*Streptelasma*) **corniculum**, Hall. Pal. N. Y. Vol. 1, 1847, *Trenton* and *Hudson river* formations. Geol. Canada, 1863, page 156, fig. 118, *Trenton formation. II c.*

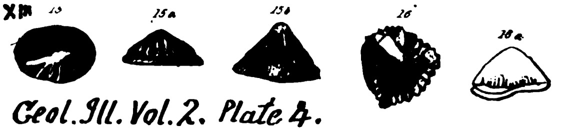
Petraia fanningana, Safford. Geol. Tenn., 1869, page 320,

plate 5, (H) figs. 3 *a* to 3 *g*; found in the *Meniscus* (*Niagara*) *limestone* of Middle Tennessee. *V b.*

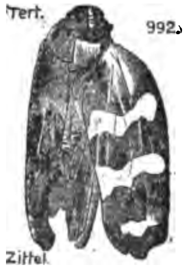
Petraia waynensis, Saff. Geol. Tenn., 1869, page 314, 320, plate 5, (H.) figs. 2 *a*, to 2 *h*; common in and characteristic of the *Meniscus* "sponge bearing" (*Niagara*) beds of Middle Tennessee. *V b.*



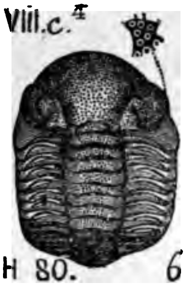
Petrodus occidentalis, New. & Wor. Geol. Ill. Vol. 2, 866, page 70, plate 4, figs. 15, 15 *a*, 15 *b* top and side views of two specimens of fish-teeth (?) 16, 16 *a*, a supposed variety of the same species, which is much like *P. patelliformis*, McCoy, from the Irish Mountain limestone. Agassiz suggested that these were not teeth, but tubercles on the skin of the fish, like the shagreen of the Sharks, and Rays; their bases show that they could not have touched each other as teeth do. They differ wonderfully, some being ten times as large as others, some circular, some oval, some with sharp points and ridged, others nearly smooth. Belleville, Ill. *Coal measures. XIII.*



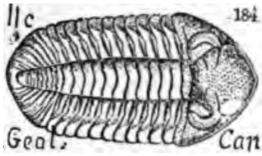
Petrolystra gigantea, Scudder. An insect found in the *Oligocene tertiary bed* of Florissant, Colorado. Figure taken from Zittel's handbuch der Palæontologic, fig. 992 *natural size.—Tert.*



Phacops bufo. (*Calymene bufo.*) Hall, Geol. Fourth Dist., page 200, fig. 80,6. Rogers, Geol. Pa., page 828, no figure. *Hamilton formation.* (Green's Monograph of Trilobites, 1832.) See Hall's Pal. N. Y. Vol. VII, 1888, plate 8.—In Monroe Co., Pa., near Stroudsburg, it occurs in *Corniferous limestone*, G6, p. 121. At Marshall's Falls, collected by H. D. Rogers, and C. E. Hall. *Marcellus?* In Centre Co. by Ewing from *Marcellus.* T4, 33.—*V a, b.*

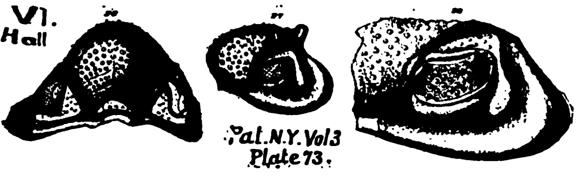


Phacops callicephalus. Hall. See **Dalmanites callicephalus.** The figure here added to those given on a previous page (p. 187) is from Geol. Canada, 1863, page 187, fig. 184, a perfect specimen of this beautiful trilobite of *Trenton age.* *II c.*



Phacops crassimarginatus. See **Proetus crassimarginatus.** *VIII c.*

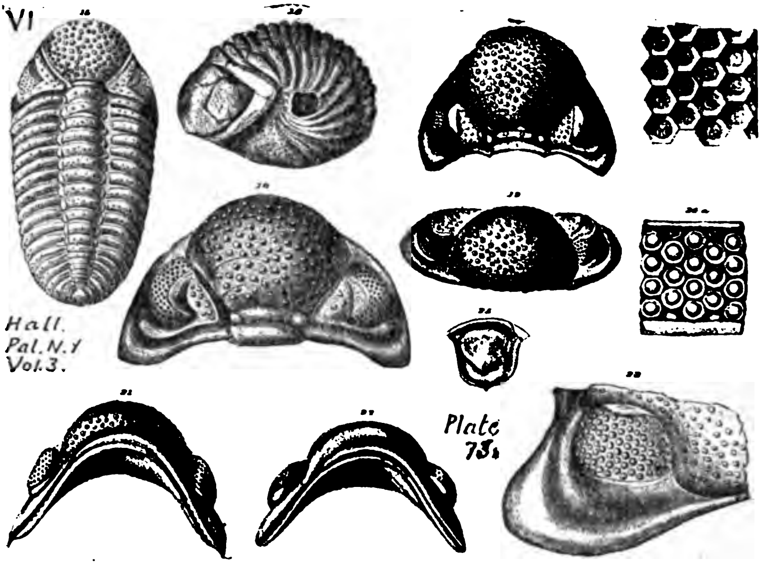
Phacops hudsonicus, Hall. Pal. N. Y. Vol. 3, 1859, page 355, plate 73, figs. 26, the head of the tribolite; 27, seen in profile; 28, *enlarged* eye. Its small eyes extend backward to the line of the first annular furrow, having an elevation of four ranges of lenses. Species founded on a singlo head (the test being removed from the glabella) found at Becraft's mountain, near Hudson N. Y, in the compact beds of shaly limestone of the *Lower Helderberg.* *VI.*



Phacops limulurus. See **Dalmanites limulurus.** Rogers, Geol. Pa. p. 823. No figure. *Vb.*

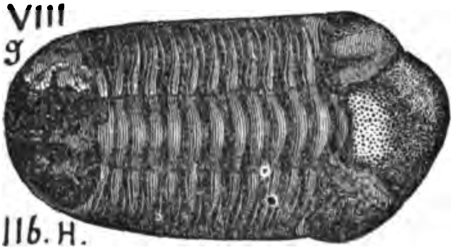
Phacops logani, Hall. Pal. N. Y. Vol. 3, 1859, page 353, plate 73, fig. 15, head compressed and eyes a little distorted; 16, a rolled up individual; 17, larger head, transverse furrows, eyes in good form; 18, large head, with few pustules; 19, front view of 17; 21, lower side of another head, cremulations along the side furrow; 22, specimen which has had the grained sur-

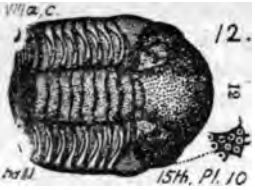
(*Phacops logani*, *Continued.*)



face worn smooth, showing the hypostomal suture; 23, eye enlarged; 44 eye which has lost its lenses by weathering; 24 *a*, part of an eye magnified; 25, a hypostoma. Hall says that this species is (after *Dalmanites pleuroptyx*) more common than any other Lower Helderberg trilobite, often rolled up, usually in fragments, separate heads to be found in the lime shales at various places west and south of Albany.—It has been seen by Dr. Barrett of Port Jervis in White's *Stormville limestone* on the Delaware. G6, p. 134.—In Perry Co., Pa., three miles east of Icksburg, see Claypole's spec. 12,714 (1876.)—*Lower Helderberg*, *VI.*

Phacops nupera. (*Calymene nupera.*) Hall, Geology of the Fourth District of New York, page 262, fig. 116. (See also *Calymene lævis.*) *Chemung*, *VIII g.*

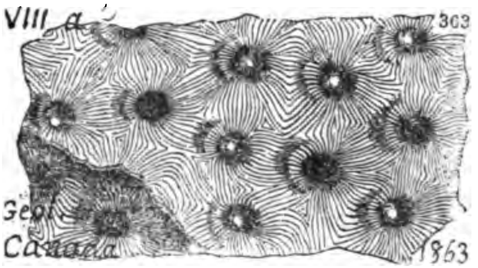




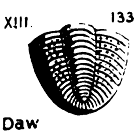
Phacops rana. Hall. (*Calymene bufo*, var. *rana*, Green.) Pal. N. Y. Vol. 7, 1888, plate 7, many fine figures.—15th Annual Report, N. Y. 1862, page 93, plate 10, fig. 12. Green's original specimen of *C. bufo* was 4⅛ inches long by nearly 2 broad. In New York Hall never saw this trilobite entire more than 2½ inches long; some separated heads 1⅛ inch, which (X3) would make the largest animal 3½ inches; proportions quite different from *C. bufo*, and specifically distinct from *P. rana*, both in *U. Held.* and *Ham.* rocks. Green's *C. bufo*, var. *rana*, from Hamilton shales of Ontario Co. N. Y. is common, and occurs also in *U. Held.* strata. Abundant; size half inch to nearly 3 inches; heads and tails indicate that individuals reached 3½ inches. More like *P. fecundus*, Barrande, than any other. Several varieties could be established. *U. Helderberg limestone*, throughout N. Y.; *Hamilton* everywhere. *VIII a, c.*—In Pennsylvania found by I. C. White at Cattawissa, and near Northumberland (G7, pages 289, 339) in what would be the *Tully limestone*, if it did not contain exclusively the common *Hamilton* forms. (Claypole.) Also, along Fishing Creek, Hemlock township, Columbia Co. it occurs in a richly fossiliferous bed 100′ below the top of *Hamilton formation* (here unaccountably thin. G7, 76, 229). See Spec. 12,152 and 12,185 from Bloomsburg.—In Perry Co., Smith's quarry, Spring township, Spec. 11,957, base of *Hamilton*; Mt. Pisgah, 12,583; Centre mills, 12,815; both *Marcellus chert* beds; Barnett's mill, 11,673 (nineteen examples); Drumgold's tannery 12,415 (four); Brickfield, 12,486 (four), all from *Hamilton upper shale*; Honzell's narrows, 12,459, *Hamilton sandstone.*—In Huntingdon Co. at Cove station, and Weaver's run section, (T3, 105, 115, 156,) under *Marcellus black* shale, in *Marcellus* (*Corniferous? limestone;* also at Huntingdon (Spec. 12,786, two) and at Rough and Ready, in *Hamilton upper shales*, (T3, 109, 110:) also Crooked Creek crossing, Walker township, cliff of *Hamilton upper* sandstone, (T3, 212.) —Specimens in the cabinet, 801–24 (eleven in all) from Marshall's Falls; 804–78, 804–79 (six heads), 804–80 (nine bodies), 804–84 (a head), 804–98, all in Fellows and Genth's collections on Marshall's Creek, 1875, Monroe Co.—805–32, from Bell's Mills, Blair Co.—807–31 (very poor impression), 807–33 (pygidium, species doubtful), 807–34 (cast of head), 807–4 (cast of head), all F. & G. Coll. Kintner's farm, 1 m. S. W. from Marshall's Falls, Monroe Co.—NOTE, 801–26 is unspecified.—For a *fossil eye* of *Phacops* or *Dalmanites*, see Claypole's specimen 12,675 (161–4).—*VIII b, c.*

Va.
Pal. Ohio. II.
f. 1.
Pl. V.

Phænopora expansa (See figures under **Ptilodictya expansa.**) Hall & Worthen. Pal. Ohio, Vol. 2, 1875, page 114, plate 5 fig. 1, *nat. size*, part of a leaf (frond) which has preserved the outer surface (on the right), but the greater part shows the inner face of the opposite laminæ. Found in *Clinton limestone*, near Dayton, O. Closely allied to, perhaps identical with, *P. constellata*, Hall, a bryozoon of the *Clinton formation* in New York.—*V a.*

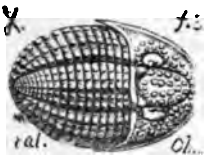


Phillipsastr a verneuili, Edwards and Haime. Geology of Canada, 1863, page 364, fig. 363. From the *Upper Helderberg* (*Corniferous limestone*) *formation* of Canada.—*VIII a.*

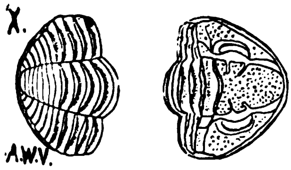


Phillipsia howi, Billings, Can. Nat. Vol. 8, p. 209. Dawson's Acad. Geol., 1868, page 313, fig. 133; a trilobite only known by its tail piece, in which it differs from *P. meramecensis*, Shumard, and *P. insignus*, Winchell, (both of *Lower Cnrboniferous* age in the Western States,) by a greater number of rings in the axis. "These *Phillipsias* of the Carboniferous are very interesting as the last representatives of the great family of Trilobites, so abundant in the older Palæozoic rocks." Dawson. Found at Windsor, N. S.—*XI? XIII?*

Phillipsia (*Griffithides?*) **lodiensis**, Meek. Pal. Ohio, Vol. 2, 1875, page 323, plate 18, fig. 3, *magnified about twice*, from gutta-percha cast made in the mould left in a concretion, but the crenated edge of the tail is not shown; nor the row of tubercles along the edge of the head-piece, the form of which is like *Phillipsia;* but the unfurrowed shield and smooth eyes are those of *Griffithides*. The fimbriated edge of the tail is like *Pröetus*, (section *Phaeton.*) Nearer *P. mccoyi* of England than any other; also near *P. insignis*, Winchell, of Illinois. *Cuyahoga shales* (*Waverly*, *Pocono*,) at Lodi, O.—*X*.



Phillipsia sampsoni, Vogdes. Desc of two new species of Carb. Trilobites. Trans. N. Y. Acad. Sci., 1888, Vol. 7, page 246, woodcut, F. A. Sampson's specimen from the *Chouteau limestone*, Sedalia, Miss. Readily distinguished from all other Phillipsias by its limited number (7) of rings in the axis of the tail piece (pygidium.) *Subcarboniferous*. *X*.



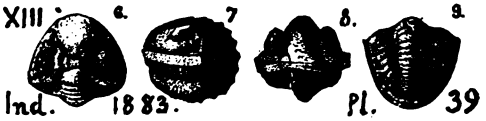
Phillipsia (*Griffithoides?*) **sangamonensis**. (Meek &

144 PHILLIPSIA SANGAMOENSIS

Worthen, Proc. Acad. Nat. Sc. Philada., 1865, p. 271; Illinois Report, 1873, Vol. 5, p. 615, plate 32, fig. 4.) Collett's Indiana Rt. 1882, page 174, plate 39, figs. 4, 5, *natural* size, head and tail of separate individual trilobites of this species. Not so often found as *Phillipsia scitula*, but in the same localities.—In the Coal measures of various states.—Two tail pieces (pygidia) were by Heilprin among the fossils from the Mill Creek limestone bed, in the museum of the Wyoming Hist. Soc. Wilkes-Barre. Geol. Sur. Pa. An. Rt. 1885, pp. 446 and 456, figs.

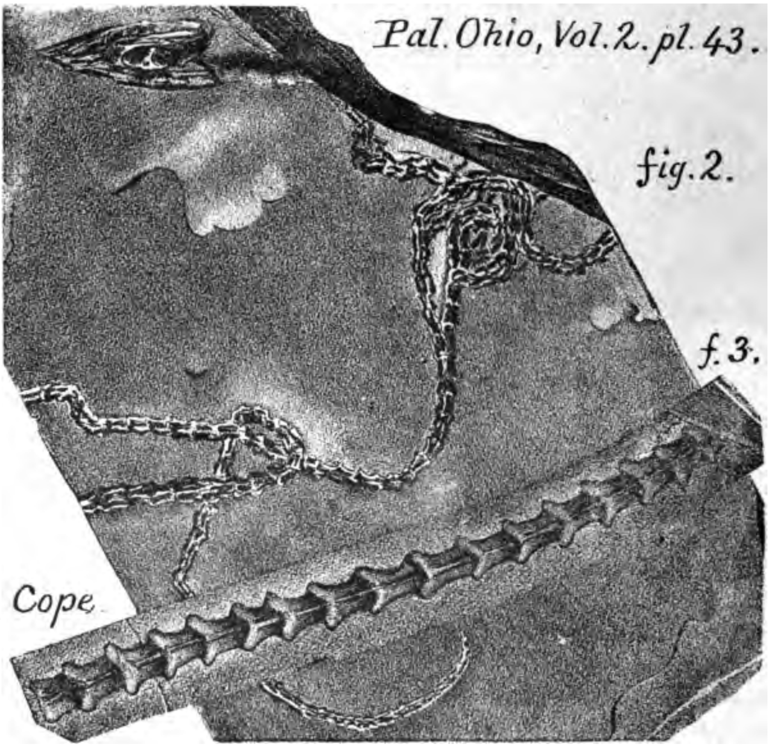
14 and 14 A; 1000′ feet above the base of the *anthracite* Coal Measures.—In Greene Co., Pa, it is reported from the *Decker's creek shale* under Mahoning sandstone, L, p. 37.—*XIII.*

Phillipsia (*Griffithoides?*) **scitula**, (Meek & Worthen, Illinois Report 5, 1873, plate 32.) Collett's Indiana Rt., 1883, p. 173, plate 39, figs. 6, 7, 8, 9, all natural size; one trilobite viewed from four sides, one showing the body rolled up. *Coal measures* in various States.—*XIII.*



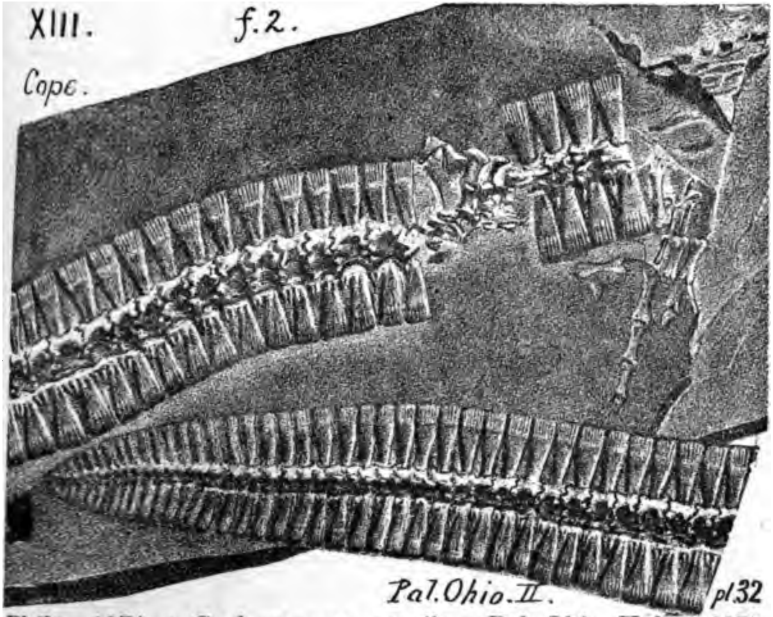
Phillipsia stevensoni, Meek. Regent's Report of the University of W. Virginia, 1871.—Found by J. J. Stevenson in *Lower Carboniferous* rocks in the gaps of Fayette and Westmoreland Cos., Pa. K3, p. 311.—*Kaskaskia, XI.*

Phlegethontia linearis, Cope Trans. Amer. Philos. Soc.,

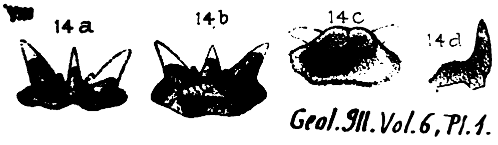


1874, a Coal Measure reptile.—Pal. Ohio, Vol. 2, 1875, page 367, plate 43, fig. 2, *natural size;* fig. 3, *magnified twice*, vertebræ from another specimen. In fig. 1, the entire outline of the skull is preserved, but nothing definite as to sculpture or dentition; vertebræ have a zigzag interlocking of neural arches; are very numerous (56+); total length, if straightened out, 11 and 12 inches.—*Coal measures*, *XIII.*

Phlegethontia serpens, Cope, Trans. Amer. Philos. Soc. Phila., 1874, a *Coal measure* reptile.—Pal. Ohio, Vol. 2, 1875, page 367, plate 32, fig. 2, showing part of the vertebral column of a much larger batrachian reptile than *P. linearis*; 22 vertebræ being preserved, devoid of ribs, etc., and evidently connected by tendenous bands; set with neural spines. (*Figure of vertical column misplaced on page 487 above.*) This species seems to be rare at Linton, Ohio.—*XIII.*

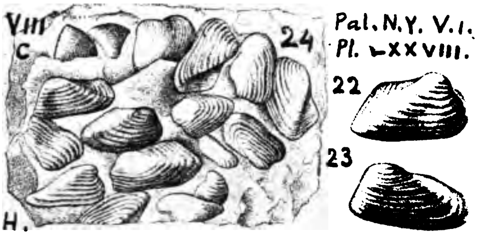


Phœbodus sophiæ, St. John and Worthen, Geol. Illinois, Vol. 6, 1875, page 251, plate 1, fig. 14 *a*. *enlarged* front face of fish-tooth of larger size; *b*, back



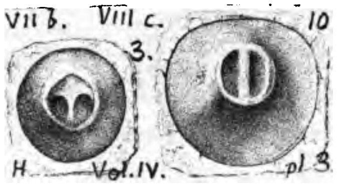
face, showing well-defined prominence in upper basal surface; *c*, lower basal surface; *d*, profile section. Waterloo, Iowa, *Middle Devonian*, magnesian beds over the Coralline limestone.—*VIII.*

Pholadella parallela, Hall. (*Grammysia parallela*, Hall, 1870). Pal. N. Y., Vol. 5, part 1, 1885, page 470, plate 78, fig. 22, 23, 24. *Hamilton* at Fabius, and Sken. Lake, N. Y. —Recognized by Prof. Hall (Nov., 1888) in Spec. 808–15 (OO, p. 235) in Fellows' collections at Dingman's Falls, Pike Co., Pa., from *Hamilton.*—See Claypole's Perry Co. spec. 12406 (99–34) in company with a *Phacops rana*, from *Hamilton upper shale, VIII c.*

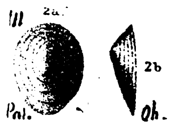


Pholas candida, mentioned by Lesquereux as one of the shells found in the sand layers between the modern peat beds of the European coasts, to illustrate his report on the origin of coal beds in Annual report of 1885, p. 117.—*Recent.*

Pholidops arenaria. Hall, Pal. N. Y. Vol. 4, 1867, p. 413, pl. 3. fig. 3, (not 10, which is a figure of *Pho. oblata*, of the Schoharie Grit, from which *Pho. arenaria* differs in being rounder, with a larger muscular impression. Hall.) *Oriskany*, VII.—Doubtfully identified by G. B. S. in spec. 803–17 of C. E. Hall's Orbisonia collections, Huntingdon Co., Pa., in *Hamilton shale, VIII c.*

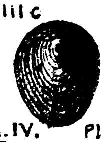


Pholidops cincinnatiensis, Hall, pamphlet 1872.—Pal. Ohio, Vol. 1, 1873, p. 130, pl. 5, fig. *a*, *magnified about three times*, view from above; *ditto*, profile; smaller valve unknown; closely allied to the *P. ovatus* of the Upper Silurian shaly limestone (VI), which has twelve scaly lines of growth and this only seven or eight, which would not make a different species of it but for the different geological horizon. [In my opinion



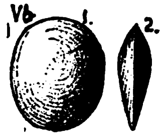
this is always arguing in a circle. J. P. L.]—*Hudson river* shale at Cincinnati, O.—*III b.*

Pholidops hamiltonensis, (*Hamiltoniæ*, Hall, 1860, 13th An. Rt. Pal. N. Y. IV. p. 32, pl. 3, fig. 6. *Hamilton.*) Claypole's specimen 11,705 (5–66) from Barnett's Mill, Perry Co., Pa. *Hamilton upper shales. VIII c.*



Pholidops oblata, Hall. Pal. N. Y. Vol. 4. p. 414, pl. 3, fig. 10 (given with the figure of *P. arenaria* above). *Hamilton shales*, Onondaga Co., N. Y., *VIII c*—NOTE. Under *P. arenaria*, Hall calls it, however, a form of the *Schoharie Grit. VII.*

Pholidops ovalis, Hall. From Collett's Indiana Report of 1881, p. 284, pl. 21, fig. 1, 2, *greatly enlarged*, upper valve, and profile of a specimen with both valves.—*Niagara, V b.*



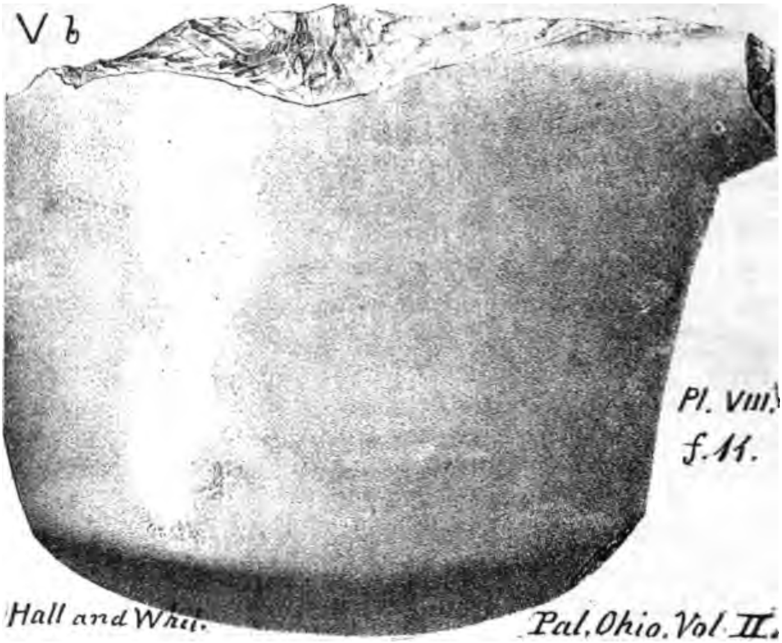
Pholidops trentonensis, Hall, pamphlet 1866, Trenton (S. A. Miller). Recognized by G. B. Simpson in spec. 210-147 of Fellows' collections at Bellefonte, Centre Co., Pa., in *Trenton limestone, II c.*

Pholidops squamæformis, (*Orbicula squamæformis*). Hall, p. 108, fig. 38, 1. (See Murch. Silurian Researches, pl. xii, fig. 14 *a*.) *Niagara limestone, V b.*

Phragmoceras ellipticum, Hall & Whitf. Pal. Ohio, Vol. 2, 1875, p. 152. pl. 8, fig. 11, view of the side of a cast, the outer chamber showing the curvature of the septum, or floor, which separated it from the last of the internal chambers, and also, the large siphuncle which connected the chambers, situated close to the inner side of the shell, which, judging from this outer chamber, must have been of great size. *Niagara limestone*, Highland Co., O., found in company with *Trimerella ohioensis.*— *V b.*

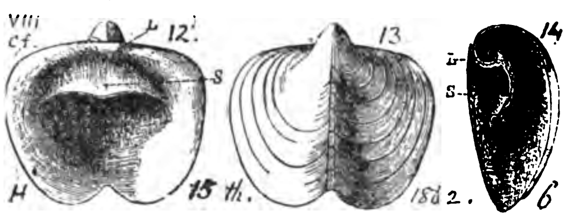
NOTE.—For figure of *P. ellipticum*, see p. 638.

Phragmoceras ellipticum, on page 637.


V b
Pl. VIII
f. 11.
Hall and Whit.
Pal. Ohio. Vol II.

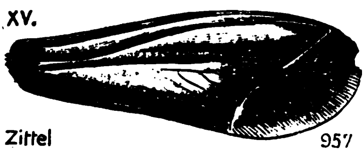
Phragmoceras hector, Billings. Pal. Foss. Vol 1, 1862, p. 163. *For figure see* S. A. Miller's N. A. Geol. & Pal. 1889, p. 453. *Guelph. formation.— V b.*

Phragmoceras natator, Hall, (*Bellerophon expansus ?* Hall, 1843. Not *B. expansus*, Sowerby,) 15th Annual Report, 1862, p. 60, pl. 6, figs. 12, aperture; 13, back; 14, section lengthwise. "The accidental breaking of the apex of a specimen disclosed an extension of the lip on the ventral side into the cavity of the shell, forming a septum as in the typical forms of *Phragmoceras*." Perhaps Sowerby's *Bellerophon* may turn out to be also a *Phragmoceras* (Hall). *Hamilton coarser shales*, Chenango Co., and *Portage* shale, Genesee Co., N. Y.— *VIII c, f.*



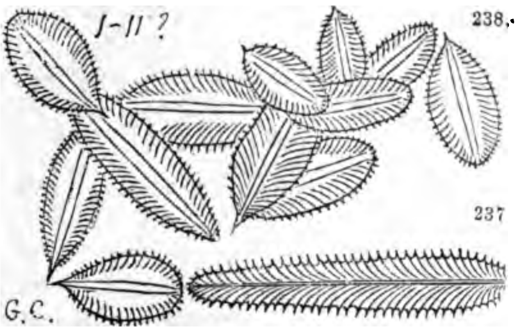
Phragmoceras parvum, H. & W. Pal. Ohio, Vol. 2, 1875, p. 151, pl. 8, fig. 10, side view of a specimen from the upper limestone beds of the *Niagara formation*, at Cedarville, Greene Co., O., differing from any other species of *Phragmoceras* in its smallness, general form, and rapid curvature, combined with protruding tube-like process at the ventral end of the aperture.— *V b.*

Phthanocerus occidentalis, Scudder. A cockroach from *upper carboniferous beds*, Kansas City, Mo. Proc. Bost. S. N. H. Vol. 21, 1882, p. 58, in the Lacoe collection at Pittston, Pa.— Figure borrowed from Zittel's Handbuch, fig. 957 (magnified *three times*).—*X V.*

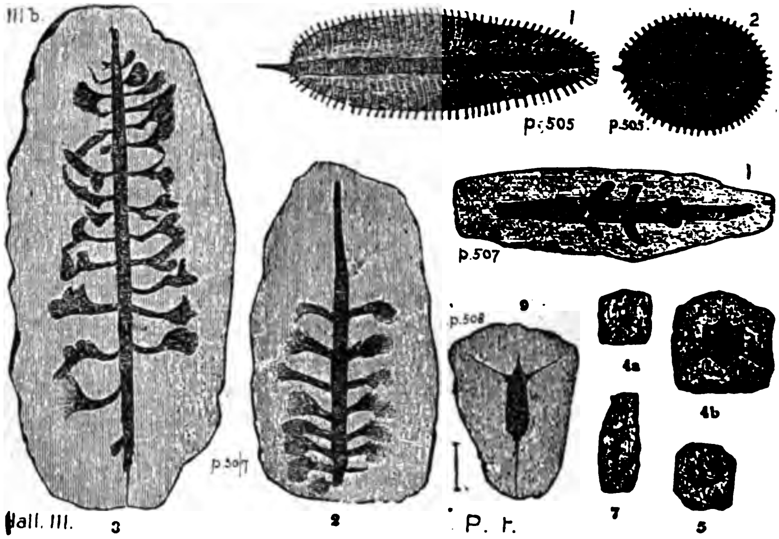


Phthonia ———— P′ In Carll's collections, reported by C. E. Hall, MS. Report Dec. 30, 1876. *Chemung–Catskill, VIII–IX.*

Phyllograptus angustifolius, Hall. Geology of Canada, 1863, p. 228, fig. 237, *natural* size of this leaf-shaped graptolite. (On the same cut is given a group of *Phyllograptus typus*, Hall's figures of which are given under that name following.) Both species are referred in Logan's book to the *Quebec group* of strata, formerly regarded as *Lower Silurian* (*Siluro–cambrian*, or *Ordovician*), but now known to be composed of formations, conformable and unconformable, of *Precambrian*, *Cambrian* and *Cambro–Silurian* ages, up to *Trenton* and *Utiva.* See Walcott's review of Ells's Report, in Am. Jour. Sc. for Feb. 1890, p. 104 onward.— *Sillary SS*, C.

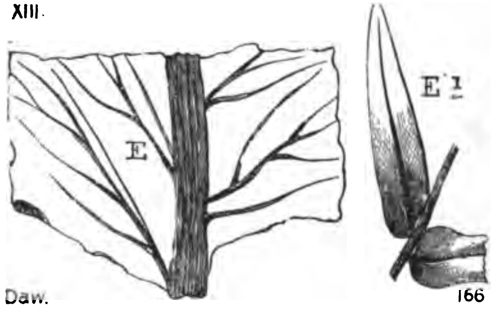


Phyllograptus typus. A graptolite figured by Hall, Pal.



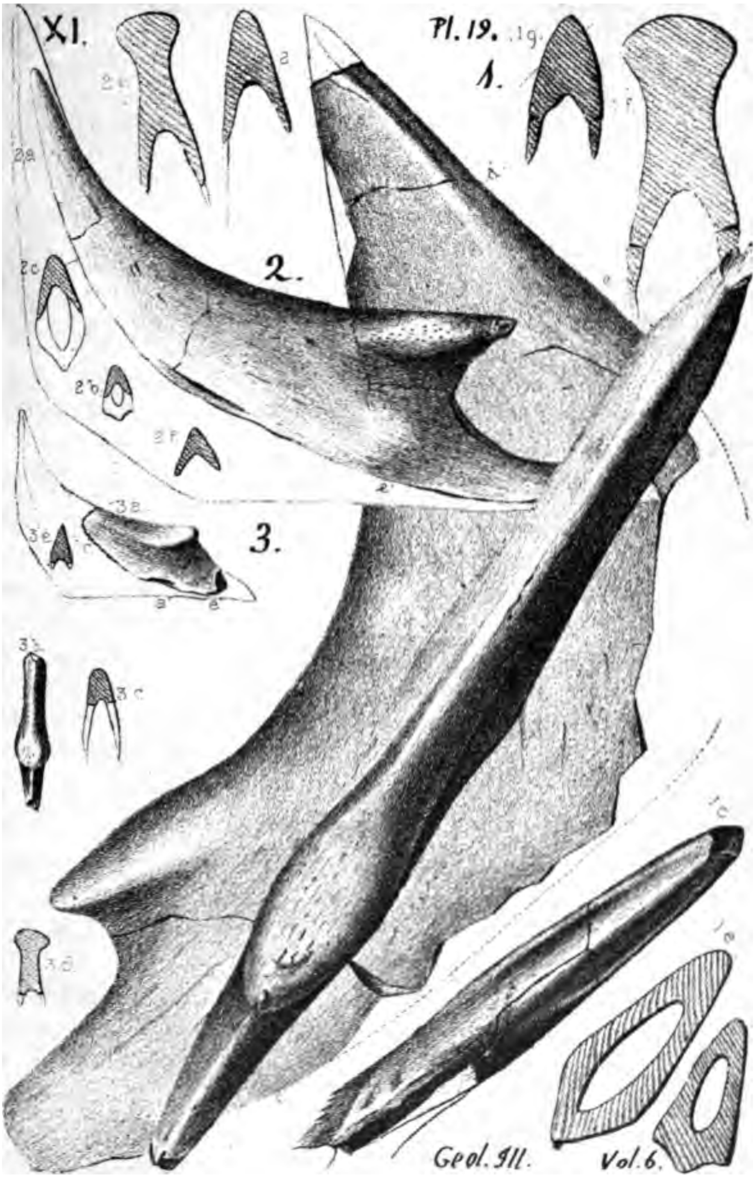
N. Y. Vol. 3, 1859, p. 505, 507, 508, figs. 1, 2; 1, 2, 3; 4 *a*, 4 *b*, 5, 6, 7; from the Hudson river slate formation,—*III b.*—In Logan's Geology of Canada, 1863, on page 228, fig. 238 represents a group of these graptolites from the *Quebec slates* of unsettled *Lower Silurian* age. That figure is given under *P. angustifolius* above. In Ells's Report on the Quebec region, quoted by Lapworth in Trans. Roy. Soc. Can. 1886, p. 167–184, this graptolite appears, with *Obolella preciosa*, etc., in red and black shales (*Cambrian*) under *Levis* (*Ordovician*) shales.

Phyllopteris antiqua, Dawson. Acadian Geology, 1868, p. 446, fig. 166 E, a *magnified* portion of pinnule to show the nervation; E 1, two pinnules of *natural size.* Midrib well defined. This genus of ferns is mostly later than the Coal age, and Dawson refers this species to it with some doubt. Nova Scotia *Coal measures.*—*XIII.*



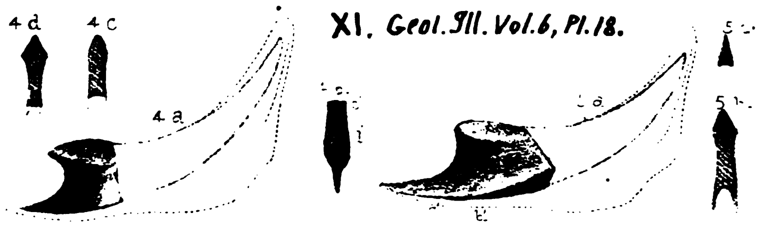
Physa heterostropha, Say, in the shell marl at Harmonsburg, Crawford Co., Pa., Q4, 41. *Post glacial.*

Physonemus altonensis, St. John & Worthen, Geo. Sur.

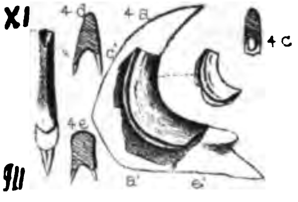


Ill., Vol. 6, 1875, p. 454, pl. 19, figs. 1 *a*, *b*, *c*, etc., large fish spine, side and hind views, and cross sections; 2 *a*, *b*, etc., smaller one. side view and sections; 3 *a*, *b*, *c*, etc., very small one. side and front views, and cross sections. Two localities in Iowa and Illinois. *St. Louis limestone* (next to top division of sub-conglomerate limestones). *XI.*

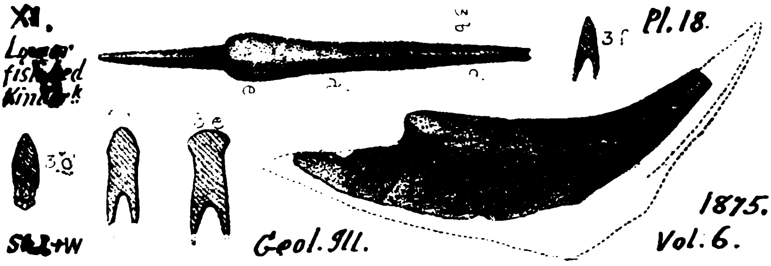
Physonemus carinatus. St. John & Worthen, Geo. Sur Ill., vol. 6, 1875, page 452, plate 18, figs. 4*a*, side view of fragment of fish.spine, restored; *b*, front view; *c*, *d*, cross sections; 5*a* side of a more compressed specimen; *b*, *c*, cross sections. Burlington, Iowa; Upper fish bed in the *Kinderhook limestone*. *XI.*



Physonemus chesterensis, St. John & Worthen, Geo. Sur. Ill., vol. 6, 1875, page 455, plate 19, figs. 4*a*, *enlarged* ×2, side view of fish spine, with cross section *natural size*; *b*, ×2, front view; *c*, *d*, *e*. ×2, cross sections. Chester Ill. *Chester limestone* (upper division of the sub-conglomerate limestones.) *XI.*

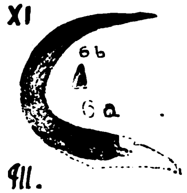


Physonemus depressus, St. John & Worthen, Geo. Sur.

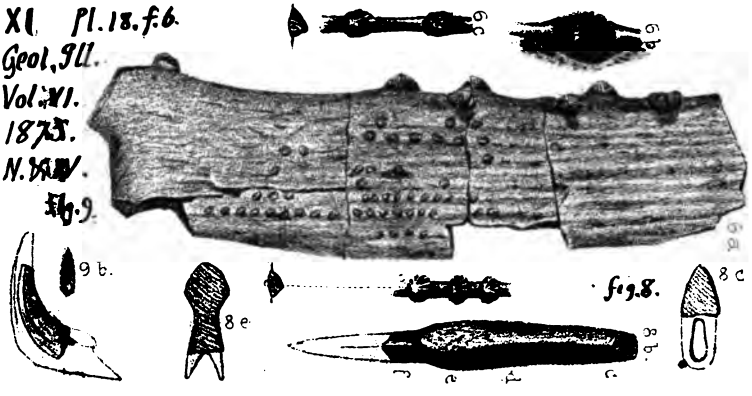


Ill., vol. 6, 1875, page 452, plate 18, figs. 3*a*, side view of fish-spine, backedge restored; *b*, front face; *c*, *d*, *e*, *f*, cross sections. Burlington, Iowa. Lower *Kinderhook* fish bed. *XI.*

Physonemus falcatus, St. John & Worthen Geo. Sur. Ill., vol. 7, 1883, page 252, plate 24, figs. 6*a*, right side of fish-spine; *b* cross section near tip. St. Louis. *St. Louis limestone. XI.*

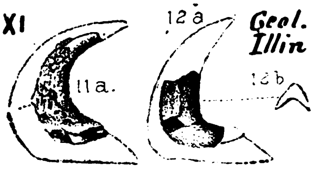


Physonemus gigas, Newberry and Worthen, Geo. Sur.

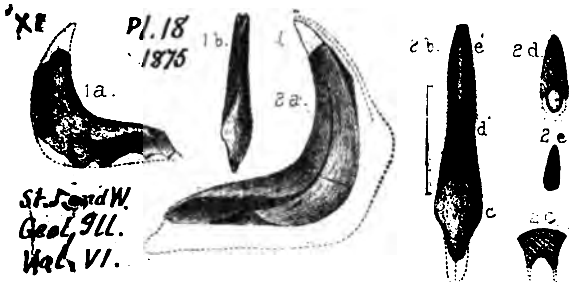


Ill. Vol. 4, plate 2, fig. 1, and vol. 6, 1875, page plate 18, figs. 6*a*, side view of fragment of large spine, with tuberculose ornamentation; *b*, *c*, tubercles *enlarged;* 8 *b*, front face of a smaller specimen; *c*, *d*, *e*, sections; 9 *b*, very small specimen (Other figures omitted). Quincy, Ill. *Upper Burlington limestone. XI.*

Physonemus parvulus, St. John & Worthen, Geo. Sur. Ill., vol. 6, 1875, page 453, plate 18, figs. 11*a*, side view, restored along back face; 12*a*, side view and cross section of fish spine, restored in outline. Boonville, and Warsaw, Ill. Rare in the fish-bed horizon of the *Keokuk limestone. XI.*



Physonemus proclivis, St. John & Worthen, Geo. Sur, Ill. vol. 56, 1875, page 451, plate 18, figs. 1*a*, side view of small fish spine; *b*, front face; *c*, cross section near broken tip; *d*. section across shoulder; *e*, section just above shoulder. 2*a*, *enlarged* ×2, side of smaller specimen, hind end restored; *b*, front, ×2; *c*, *d*, *e*, sections; *b*, hind face restored. Lower fish bed in *Kinderhook limestone. XI.*

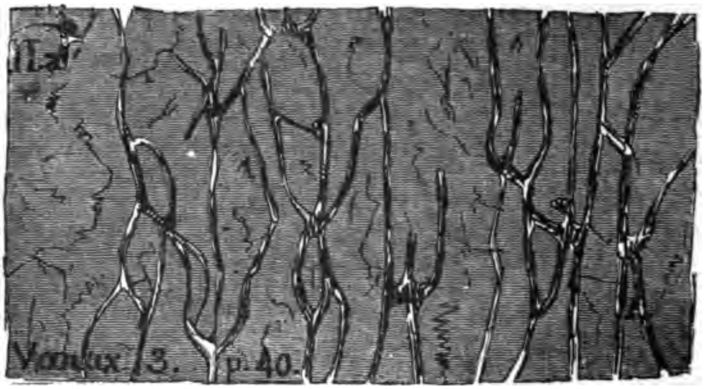


Physophycus marginatus. Europe. **Taonurus marg.** XIII.

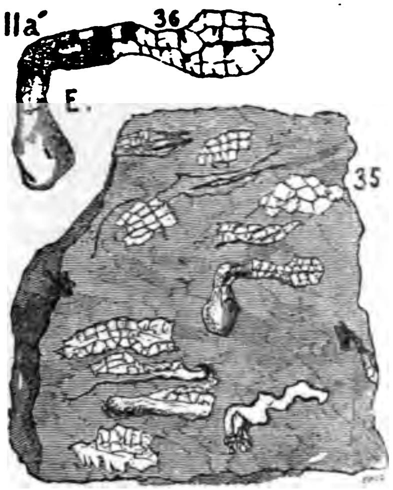
Phytolithus parmatus. Europe. See **Ulodendron minus.** XIII.

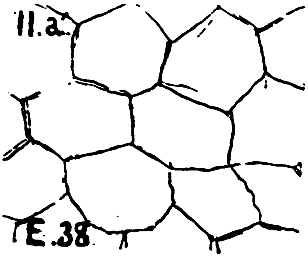
Phytolithus tessellatus, Steinhauer, Trans. Amer. Philos. Soc. Phila. Vol. 1, 1818, p. 295, plate 7, fig. 2. See **Sigillaria tessellata,** Brongt. 1828, above.

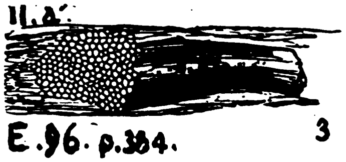
Phytopsis tubulosa? (*Fucoides demissus.*) Vanuxem Geology of the Third District of the State of New York, between Lake Ontario and Pennsylvania, 1843, page 39, fiff. 3,

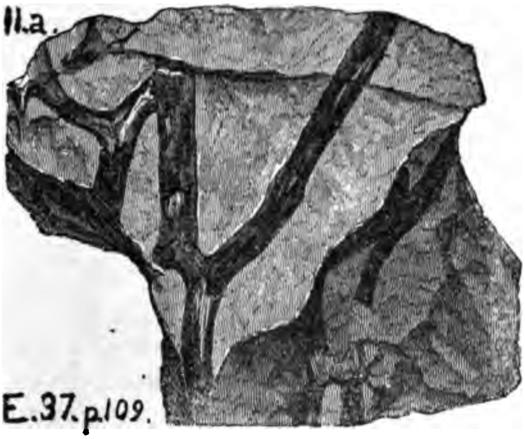

Vanux 13. p. 40.

(*Phytopsis tubulosa*, continued.)









11.a.
E.37.p.109.

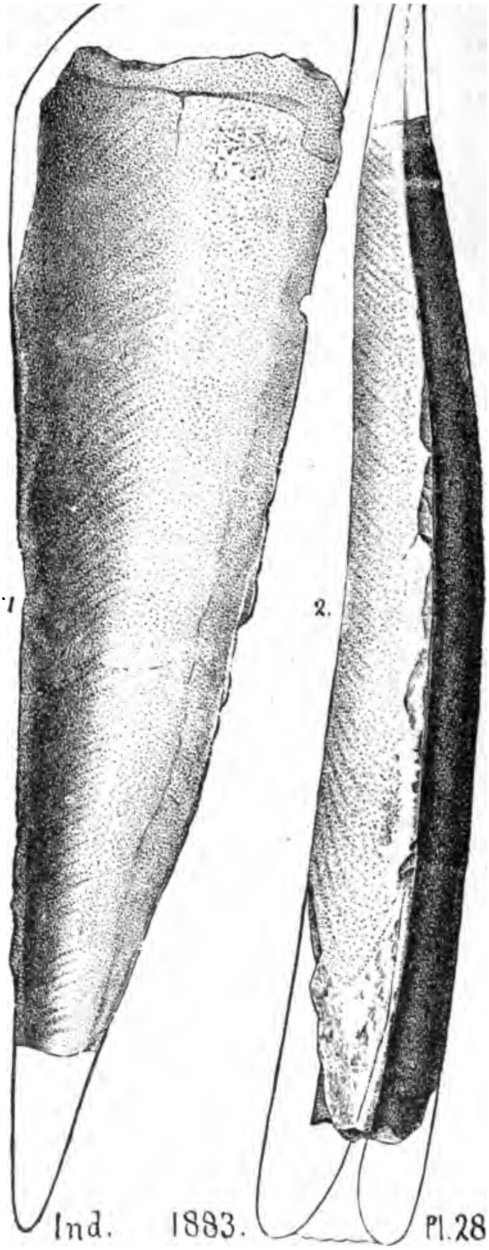
Birdseye limestone—Emmons, page 109, figs. 35, 36,37,38, and pages 383, 384, figs. 94, 95, 96. (See Hall, Pal. N. Y., Vol. 1, 1847, p. 38, 39. pl. 8, figs. 1, *a*, *b*, *c*, *d*, *e*, tubes branching and vertical. *II c.*

Piloceras explanator. *See p. 649, 650.*

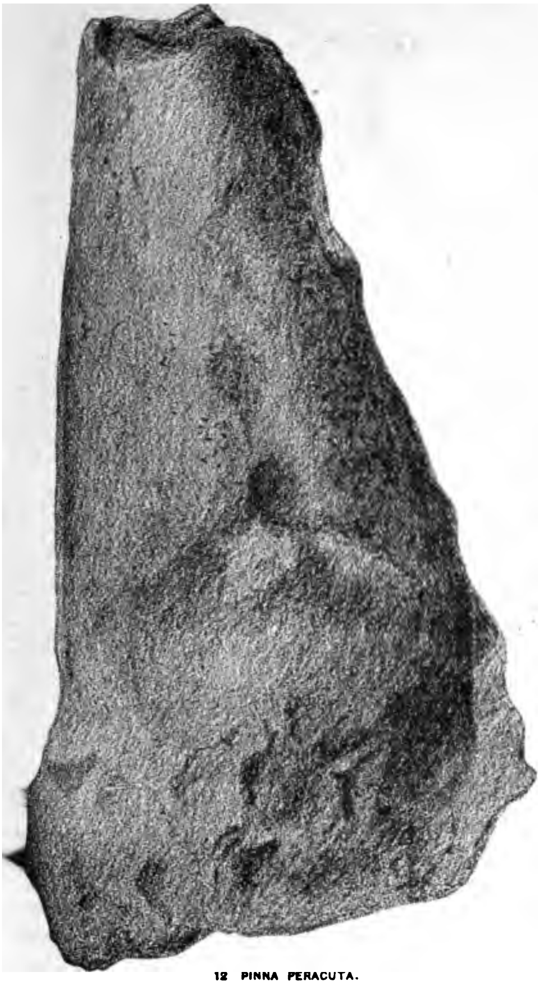
Pinites mughiformis. Europe. See **Knorria imbricata.** *XIII.*

Pinites pulvinaris. Europe. See **Knorria imbricata.** *XIII.*

Pinna missouriensis, Swallow. Trans. St. Louis Acad. Sci. 1863. *Lower Carboniferous.* Recognized by Stevenson in strata in the gaps of Fayette and Westmoreland Cos., Pa., K3, 311, *Low. Carb. X.*



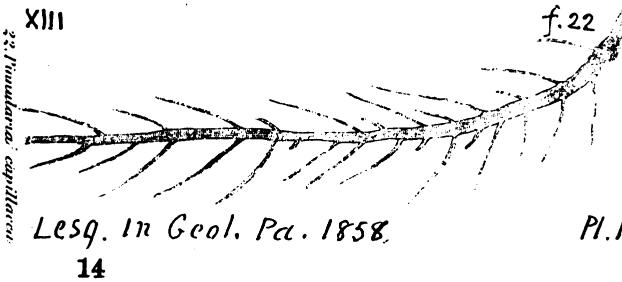
Pinna peracuta, (Shumard. Trans. St. Louis Ac. Sc. I, 214.) Collett's Ind. Geological Report for 1883, page 145, plate 28, fig. 1, *natural size;* right side view of a cast of the interior of a shell distorted by pressure; fig. 3, is a view of the back or hinge of the cast The hind edges of the two valves of the shell are turned up sharply so as to give the hinge margin the appearance of a keel. Species remarkable for its long and slender form; the largest specimens not less than 8½ inches long. *XIII—XV.* Known to be found in both Lower and Upper Coal Measures, from Indiana to Nebraska, and in Lower, Middle and Upper Coal Measures of Indiana.—Fig. 12, on page plate 444 of the An. Rt., 1885, of Penn. Survey is added to show how an imperfect cast of it·



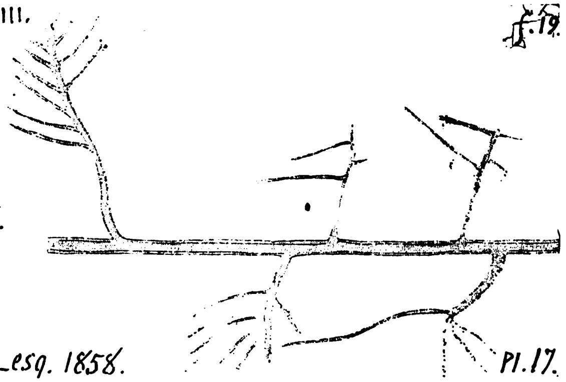
12 PINNA PERACUTA.

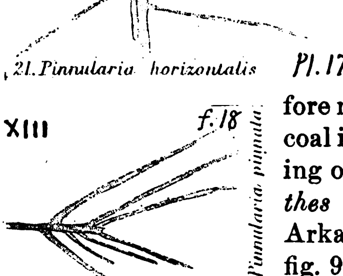
looks; one of several now in the collection of the Mill Creek Limestone fossils belonging to the Wyoming Hist. Soc. at Wilkes-Barre. See Heilprin's report (in An. Rt.) page 455. 1000 feet above the Conglomerate. If there be any correspondence of thickness in the coal measures of eastern and western Pennsylvania, this limestone must represent the *Great limestone* of the *Monongahela bituminous coal series.* —*XV.*

Pinnularia capillacea. (Lindley & Hutton, Foss. Flora. Vol. 2, pl. III.) Lesq. Geol. Pa. 1858, pp. 848, 878, pl. 17, fig. 22; one of

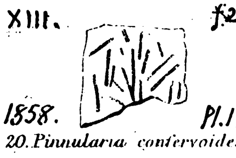


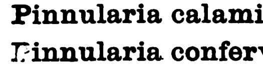
a great variety of what were evidently roots or rootlets of floating seaweeds, branching into the water, free, like bunches of pack thread, and hardly deserving of the specific names given to them in the books, such as: *confervoides*, fig. 20; *fucoides*, fig. 19; *horisontalis*, fig. 21; *pinnata*, fig. 18; also *calamitarum*, pl. 1, fig, 9 (omitted). *P. confervoides* is the only one of them that can be found everywhere in the coal measures. The thread like shining lines are in great abundance on the anthracite roof slates of Pennsylvania, and equally abundant in the English and French coals; from a hairsbreadth to one sixteenth inch wide, piled over each other; tubular; *never flattened;* no trace of joints, or branches, and therefore not *confervæ;* sometimes in the very coal itself; true roots of either the creeping or rooting ferns. See also *Rhizolithes* (*Pinnularia*) *palmatifidus*, Lesq. Arkansas Survey, Vol. 2, p. 313, pl. 5, fig. 9. Of course these roots must have been belonging to various families of plants of the coal age.—In *Darlington coal*, Beaver Co., Pa. Q. 55. *XIII.*—Also over *Waynesburg Coal*, Greene Co., Pa. K 59. *XV.*


XIII.
f.19
Lesq. 1858.
Pl. 17.
19. Pinnularia ficoides



21. Pinnularia horizontalis


XIII
f.18
Lesq. 1858.
Pl. 17.
18. Pinnularia pinnata

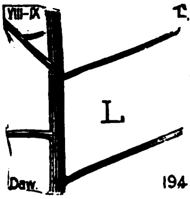


20. Pinnularia confervoides

Pinnularia calamitarum, Lesq. Geol. Pa. 1858, p. 878.

Pinnularia confervoides. *See figure above.*

Pinnularia crassa, Dawson, Ac. Geol. *XIII.*



Pinnularia dispalans. Dawson, Acadian Geology, 1868, page 555, fig. 194 L. *Upper Devonian shale* at St. John, N. B.— *VIII-IX.*

Pinnularia elongata, Dawson, Foss. Plants, Canada, 1871. *VIII-IX.*

Pinnularia ficoides, Lesq. See figure above.

Pinnularia horizontalis, Lesq. See figure above.

Pinnularia nodosa, Daws. 1871. *VIII-IX.*

Pinnularia palmatifida, Lesq. 1858. *XIII.*

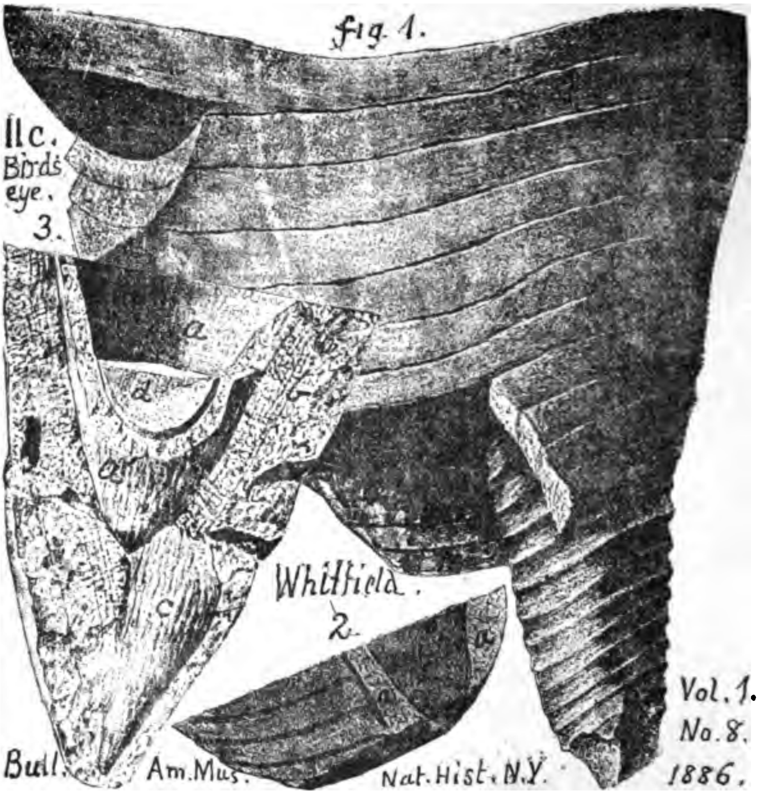
Pinnularia pinnata, Lesq. See figure above.

Pinnularia ramocissima, Dawson, Acadian Geology, 1868, p. 444, fig. 165, D ; "slender roots, or stems branching in a pinnate manner and somewhat irregularly ;" abundant in coal shales; probably the aquatic roots of *Calamites*, etc. ; always flattened; originally round, with a thread-like axis of ladder-shaped vessels, in a soft smooth cellular bark. (Dawson) —*XIII.*

(Omitted from page 645, above.)

Piloceras explanator, Whitefield, Bull. Amer. Mus. N. H., N. Y., Vol. 1, No. 8, 1886, p. 323, fig. 1, side view of lower end of large shell, the siphon protruding below the broken septa; the upper part (not figured) having five more chambers, beside the outer chamber, making the whole specimen eight inches long above the siphon ; fig. 2 (only the lower end preserved), longitudinal section of a specimen, *a*, *a*, the solid part of the siphon, *b*, solid matter filling the cavity; fig. 3 (cut off above), a large siphon broken open lengthwise ; *a*, the siphonal cavity ; *d*, solid matter filling it ; *á*, a layer of deposits which separates it from those below ; *b*, several thinner layers of deposit, but not septa ; *c*, a faulted layer apparently interrupted in its growth ; fig. 4, see also wood cut on p. 434. See Whitfield's discussion of Salter's genus and his own spicies on pp. 324, 326.— Fort Cassin, Vt. *Birdseye limestone IIc.*—(*Fig. on p. 650.*)

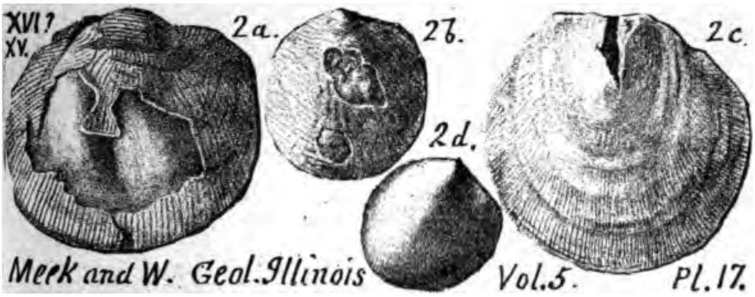
Piloceras explanator.



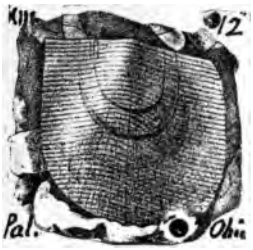
Pisocrinus gemmiformis, S. A. Miller, Journal of the Cincinnati Society of Natural History, Vol. 2, 1879, page 113, a small stone lily with pea-shaped calyx or flower, with five basal plates, three larger ones, and three small intermediate ones; five arms; and a round column, or stem. *Niagara formation, V b.*

Pisocrinus globosus, Ringueberg. (*Triacrinus globosus,*) Proceedings of the Academy of Natural Sciences, Philadelphia, 1884, p. 146. *Clinton formation, V a.* (S. A. Miller.)

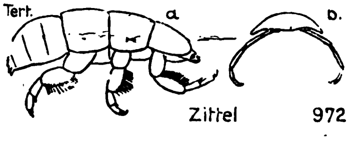
Pisocrinus pyriformis, Ringueberg, (*Triacrinus pyriformis,*) Proc. Acad. Nat. Sci., Philada., 1884, page 145. *Clinton formation, V a.* (S. A. Miller.)


XVI?
XV.
2a.
2b.
2c.
2d.
Meek and W. Geol. Illinois Vol. 5. Pl. 17.

Placunopsis carbonaria, Meek and Worthen Proc. Chi. Acad. Sci. 1866; Geo. Sur. Ill., Vol. 5, 1873. p. 578, pl. 27. fig. *2a*, upper (right) valve broken in places, but showing the peculiar transverse costæ crossing the umbo often seen on this species, as well as the radiating ribs (costæ), concentric markings, etc.; *2b*, a smaller specimen of the same valve; *2c*, a large specimen of this species (?) with much less prominent beak (umbo) and straighter hinge-edge; *2d*, small internal cast. (Genus *Placunopsis* founded for shells of the *Great Oolite* formation; never found earlier; yet these high *Coal measure* specimens agree so perfectly, as to be identifiable with Rœmer's type, *P. jurensis*, except for the cross lines. (M. & W.) Springfield, Ill. upper part of *Coal Measures*. *XV*, *XVI?*



Placunopsis recticardinalis, Meek. Pal. Ohio, Vol. 2, 1875, page 331, plate 19, fig. 12, an internal cast of (apparently) the left or upper valve showing the very curious markings peculiar to this genus of shell, named by Morris and Lycett in 1853, among the fossils of the English *Great Oolite*, because of its resemblance (*opsis*) to the genus *Placuna*. S. A. Miller gives only two American species, *P. carbonaria*, M. & W. Upper Coal measures of Illinois; and this "*straight-hinged*" *Placunopsis* of the Ohio *Coal measures*. *XIII.*

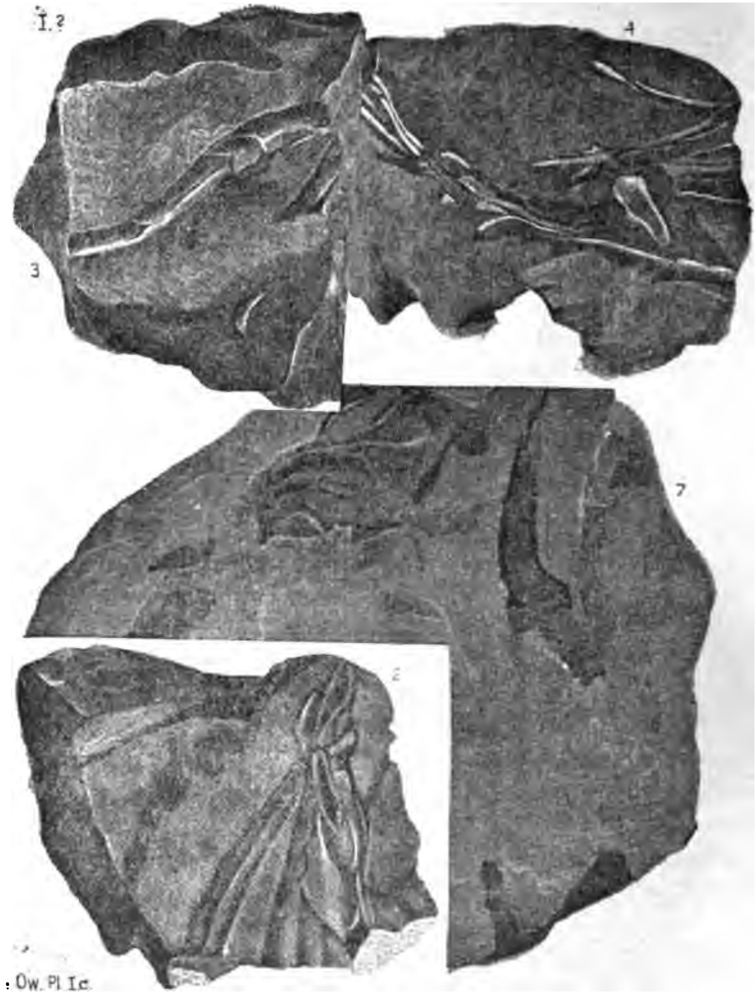


Planocephalus aselloides, Scudder. An insect found in the *Oligocene* tertiary beds of Florissant, Colorado. Figure 972 (*magnified three times*), restored, and section, in Zittel's Handbuch.

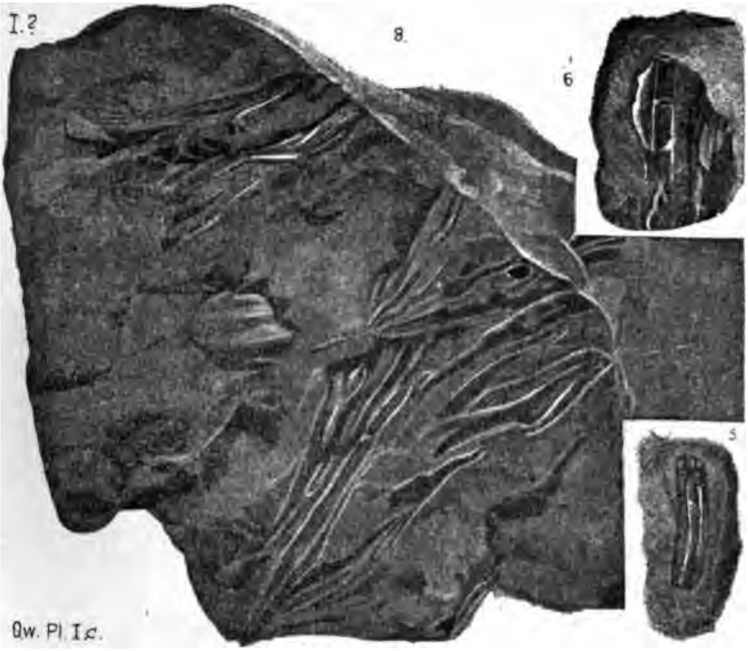
Plangtichnus erraticus, S. A. Miller, N. A. Geol. & Pal. 1889, p. 580, fig. 1093, the track of some insect pupa on subcarboniferous (*Kaskaskia*) whetstone, Orange Co., Ind. *XI.* (*See figure under* **Treptichnus.**)

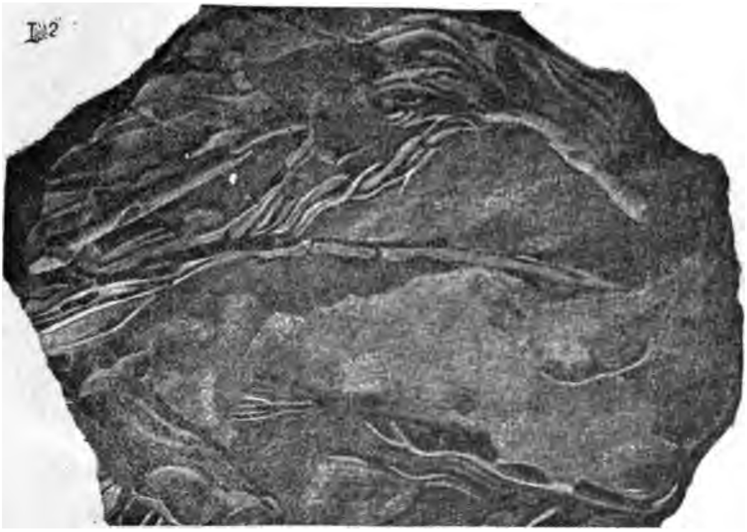
Planorbis bicarinatus, campanulatus, parvus, and **trivolvis,** shells found in the shell marl at **Harmonsburg,** Crawford Co., Pa. Q4, 41.—*Postglacial.*

Plant life undoubtedly appeared upon the planet in the



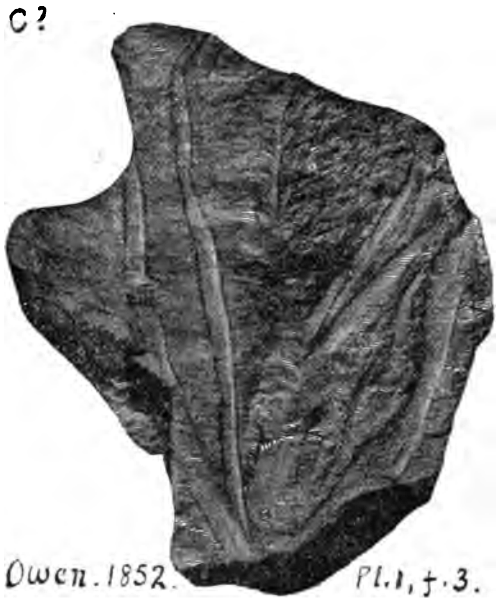
(*Very ancient plants*, figured by D. D. Owens.)





earliest times, and not in plant (or fixed) but in floating (or seaweed) forms; such as those imprinted on the primal red sandstone strata of Lake Superior (see Owen's medal-ruled figures on plate 1, in Geol. Wisc., Iowa and Minn., 1852); and such as those given by Hall, and all Palæontologists in a great number of figures; many of which, however, have been justly suspected of being the tracks, burrows, or food casts of worms, trilobites and shell fish.

Plant impressions, of Cambrian ? age, found by Owen in the very ancient rocks of the north-west shore of Lake Superior. Geology of Wisconsin, Iowa and Minnesota, 1852, plate 1, fig. 3, on a slab of red sandstone. It is the fashion just now to consider all such very ancient fossil forms to be tracks or burrows of worms, trilobites, shell fish, etc.



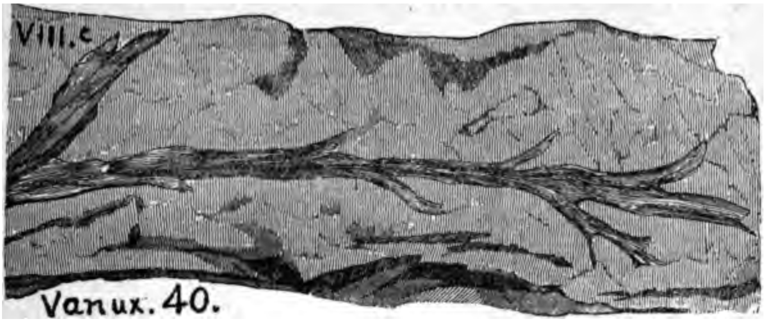
Plants of unknown age, in the *Peach Bottom roofing slates* of York Co., Pa., of unknown age, perhaps Cambrian, see *Buthotrephis flexuosa.*

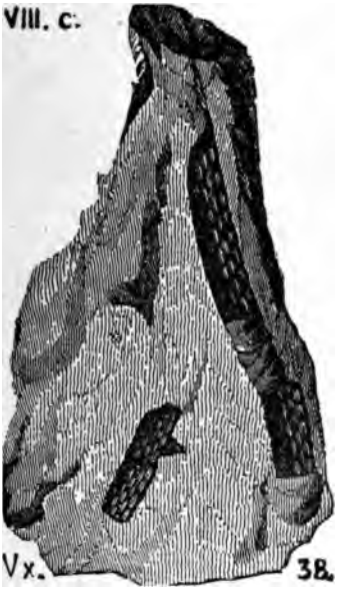
Plants, in *Trenton limestone* very obscure. Specimens 210–145, 210–151, from Bellefonte, Centre Co.—*II c.*

Plants, in sandstone beds at the bottom of the Middle Medina (red) in Blair Co., Pa., vertical stems, obscure. [Perhaps *Scolithus*, worm burrows.] T, 48.—*IV b.*

Plants, in *Clinton red shale*, very obscure. Specimens 508–7, -10, -21 (two), -25, -30, from Huntingdon Co.—*V a.*

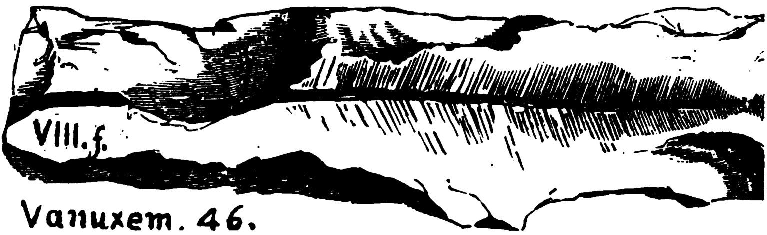
Plant from the *Hamilton formation.* Vanuxem, Geol. Third District, New York, 1842, p. 161, fig. 40. Also, p. 157, fig. 38.—*VIII c.*





Plants in *Hamilton shale.* Huntingdon Co., Pa. Saddleback gap near Orbisonia, spec. 802–1.—Pike Co. Dingman's Falls, Spec, 819–20.—*VIII c.*

Plant from the *Ithaca* (*Portage*) *formation.* Vanuxem.

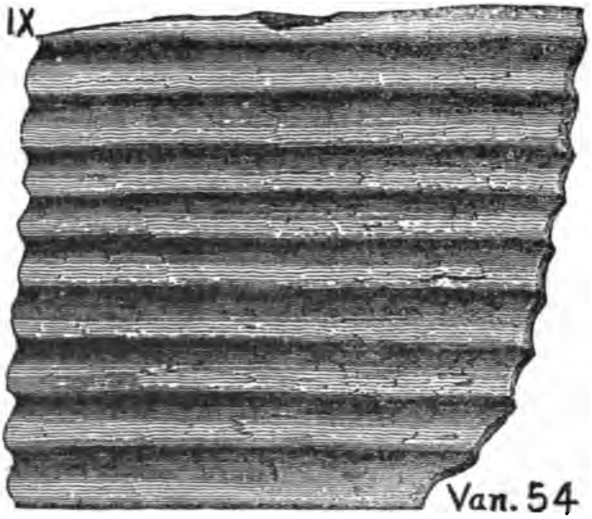

VIII. f.
Vanuxem. 46.

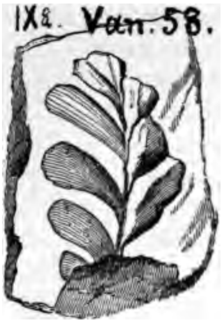
Geol. Third District, N. Y., page 175, fig. 46.—*VIII f.*

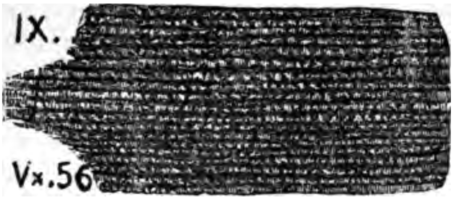
Plant in *Chemung formation.* See **Lepidodendron chemungense.**—In Bedford Co., Union township, Bobb's Creek, near Christ's, *Lower Chemung conglomerate* (pebbles as large as cherries) cast of plants. T2, 134.—In Perry Co. Claypole's specimens 11,892, 11,893 (32–C3, 2) Ropeferry, Oliver.—In Chautauqua Co., N. Y., Williams' quarry *Panama conglomerate.* Report III, p. 70.—*VIII g.*

Plant in *Chemung upper shale*, Spec. 876–1, from RR. cut near Big Shanty, McKean Co. (a slab covered chiefly with small oval elevations, ¼ in. long, some of which seem roots or stems.—Spec. 877–2 (impression, 2½ in. long, 1 in wide, no structure); 877–3 (stem? oval, 1½ in. width and length, no structure); 881–6 (minute fragment), all from McKean Co.—Spec. 883–58 (stem? 6 in. long, ¼ in wide) from Nichols, Tioga Co., N. Y.—Spec. 886–6 (slab, the surface of which has numerous ovoid or lenticular bodies, ½ in. long by ¼ in. wide) from Middletown, Bradford Co., Pa.—Spec. 889–2 (two), 889–3 (stems ⅛ in. wide. 4 inches long) from Roulette, Potter Co.—Spec. 1,000–12, –20 (finely striated), –23, –25, –26, mostly obscure, in White's coll. from Brookfield Coal Co. tunnel 2 m. S. W. of Sharon, from *Cuyahoga shale*, *X.*—In Perry Co. plants with *Lingula regina* at Shermandale mill, Spec. 12,144 (64).—*VIII–IX.*

Plants of *Catskill age.* Vanuxem, Geol. Third Dist. p. 1841, fig. 54. *XI.*

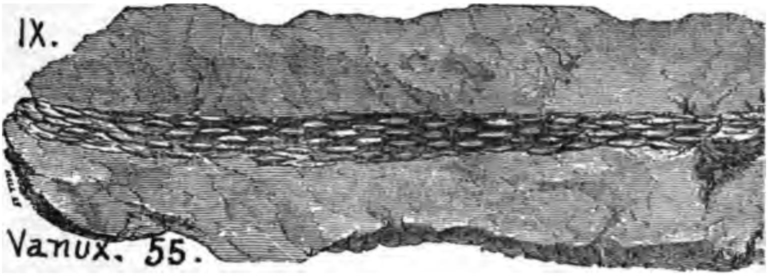


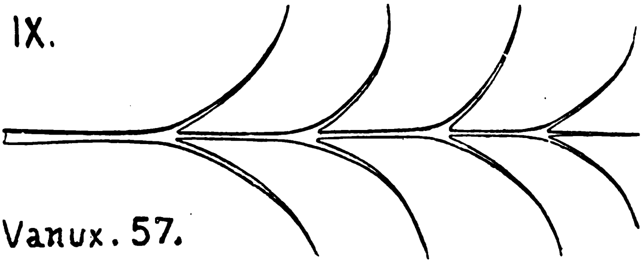




figs. 56. 58.— *IX.*

Plants, Catskill, Van. p. 191, f. 55 and 57.





Plant of *Catskill age* see **Sigillaria simplicitas**—*IX.*

Plant spores? in *Lower Catskill*, Wyoming Co. Coxton section, bed No. 30. G7, p. 61, 118.

Plant beds Nos. 24, 28 of the Catawissa section Columbia Co. G7, p. 238.—*IX.*

Plants drifted into the *Venango Co. oil sands*, and carbonized, III, p. 32. Land plants and fucoids matted together as if on an old sea shore, at Tanner's quarry, Warren Co., in the *Second oil sand?* IIII, p. 290, 297, and with fish bone fragments, p. 317.— *VIII-IX.*

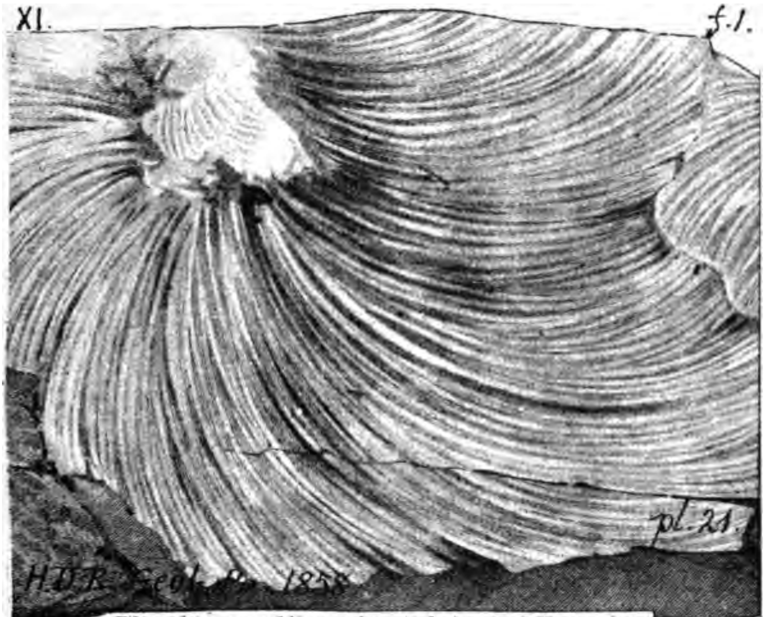
Plants in the ***Mountain Sand*** of the Venango oil region—Catalogue of specimens in Cabinet O, 3266, coally casts of plants in white sandstone 2½ m. N. E. of Titusville; 3271, ditto west of Oil City; remains in sandstone, Guild farm, 3½ m. N. W. of Pleasantville; 3296, stems in gray sandetone (***Pithole*** or *Berea grit*, *Third* ***Mountain*** *sand*) Snodgrass run, Jamestown lower quarry, Crawford Co.; 3312 impressions on arg. sandstone, Nelson farm; 3367 ditto, en brown sandstone quarry north of Warren; 3368 ditto, grey sandstone, ditto; 3372, stems in reddish sandstone, east of Conewago; O 2, 8699, impressions on black coal slate, 20′ above the bottom of *Pocono* formation, Cameron Co., Ellicott's run.—In Bedford Co. stems, in great numbers (occasionally whole casts, usually casts of interiors in sand coated with coal, often replaced by pyrites, occasionally in brown hematite ore), bed No. 3 of the Yellow Cr. section, 900′ beneath Mauch Chunk red shale, T2, p. 224.—In the Westmoreland Co. gaps, plant stuff, and thin films of coal in shale partings in *Pocono*, K3, p. 54.—*X*.

Plants in *Pocono Sandstone?* Imperfect impressions in bed No. 4 of the Morrison section, Ligonier Valley, Fayette Co. Pa., in the gap of the Youghiogheny through Laurel Hill; K3, p. 78, 79.—*X?*—Carbonized plants numerous in the ***Subolean*** conglomerate at Adamsville; under Christy's ore; and in the Jamestown section; Carll's Rt. III, p. 51, 53. 54,—*X*.—Specimens in the Cabinet: O 2846, 2847, stems in coarse sandstone from Carll farm, Venango; O 2878, in reddish shale from Haskill well, Venango; O 2927, in coarse sandstone on Ware farm. Warren; O 2934, in shale, Henderson farm, Warren; O 2936, yellow clay sandstone, Parker farm, Crawford. O 2948, in sandstone, Rooker's farm, Venango. O 2964, gray sandstone, McGee run, Venango. O 3036, brown sandstone, Tubbs farm.—*X*.

Plants in *Mauch Chunk formation*. Stems in gray conglomeritic sandstone (bed No. 16 of the Hyndman section, 345′ beneath the Conglomerate) on Will's creek in Bedford Co. Pa.; T2, p. 101.—*XI* (*X?*)

Plants in *Pottsville conglomerate*. Plant bed at bottom of *XII*, in floor of Yorkston coal bed, Wyoming county, G7, 39. 43.—Specimens in Cabinet. Cat. O, 3070, 3071, stems in gray sandstone at Parker's, Armstrong; 3168, plants and fish in Snodgrass' quarry near Jamestown (Report III, p. 56); 3187, stem on sandstone, Hazen mine, 6¼ m. S. of Evansville, Crawford county; 3199, impressions on white *Olean* conglomerate sandstone from Mushroom farm, 2 m. S of Evansville; 3212 impressions on sandstone, Bell's quarry, Franklin county; 3221 plants and fish in conglomeritic sandstone (*Olean*) at Old quarry, at Franklin.—Land plants in *Olean conglomerate*, III, p. 21.—At Eckert's bridge, Perry, Lawrence county, Q2, 85.—Stem impressions abundant in some layers of *XII*, on Rock run, Fayette county. K3, 75.—*XII.*

Plant. "Like the primordial frond of a *Platycerium*; a fern of the Pennsylvania coal measures." J. H. Balfour, in Geol. Pa. 1858, p. 684, pl. 21, fig. 1.—*XIII.*


XI.
f. 1.
pl. 21.
H. D. R. Geol. Pa. 1858

Filicoid ? resembling primordial frond of Platycerium

Plant stems and some leaves abound in the sandstone under floor clay of coal bed on Youghiogheny river below Ohiopile falls, Fayette county. K3, 83.—*XIII.*

Plant leaves extraordinarily abundant over the Cook (Fulton) coal bed, Powelton, Huntingdon county, T3, 304.—*XIII.*

Plants of the *Kittanning coal* (*Darlington bed*) at Cannelton, Beaver Co., Pa., found by Hon. I. F. Mansfield and described and figured by Lesquereux in his Coal Flora of Pennsylyania, etc., 1880; and in Proc. Am. Phil. Soc., Phila. (See List in Report PP, p. 17, 18.)

Plants of the *Pittsburgh series* (*Lower Barren Measures*) are comparatively rare and unstudied. A bed 20′ beneath the Pittsburgh coal at Wheeling, Va., has been explored with the following results: **Neuropteris** *hirsuta*, *rarinervis*, *acutifolia*, *flexuosa*, *loschii*, *grangeri*.—**Sphenopteris** *furcata*, *minutisecta* (a new species by Fontaine & White.)—**Pecopteris** *pluckeneti*, *bucklandi*, *spinulosa*, *candolleana*, *notata*, *dentata* (*plumosa*), *pteroides*. **Alethopteris** *aquilina* & *new species* allied to *gigas*.—**Lesqueropteris** *moorii*.—**Odontopteris** *new species* allied to *obtusiloba*.—**Annularia** *longifolia*, *sphenophylloides*.—**Cordaites** *borassifolius*.—**Sphenophyllum** *filiculme*, *trifoliatum* —**Asterophyllites** (near) *equisetiformis*.—**Phachophyllum** *filiciforme*.—**Calamites** *cannæformis*.—**Syringodendron** *pescaprioli*.—Many fruiting pinnicles of P*ecopterids* ; even several fruiting *Neuropteris hirsuta* ; fine fruiting *Alethopteris aquilina*. NOTE. The *L. moorii* elsewhere belongs to higher horizons. (Report PP, p. 20.)—Fine stems (and sometimes casts) are commonly to be found in the *Mahoning sandstone* beds (K3, 306). They crowd some of the layers on Laurel Hill run, St. Clair, Westmoreland. K3, 110, 175.—There is a plant bed in the 50 foot sandstone, 80′ under the Pittsburgh coal, at Carman's, on McGuires' run, Washington county, K, 295.—XIV.

Plants of the *Monongahela series* (*Upper Productive Coal Measures*) belong to the great fresh-water limestone age. They have been studied by Fontaine & White as chiefly collected from the roof shales of the highest large bed of the series, the *Waynesburg Coal*, and figured and described in their Report PP, 1880:—**Equisetides** *rugosus* Schimper, *elongatus* F. & W. *strictus* F. & W.—**Calamites** *suckowii* Bgt.—**Nematophyllum** (n. g.) *angustum* F. & W.—**Sphenophyllum** *latifolium* F. & W. *filiculmis* Lesq. *densifoliatum* F. & W. *tenuifolium* F. & W. *longifolium* Ger. *oblongifolium* Ger.—**Annularia** *carinata* Gutb. *longifolia* Bgt. *sphenophylloides* Ung. *radiata* Bgt.—**Sphenopteris** *acrocarpa* F. & W. *dentata* F. & W. *lesquereuxii ?* Newb. *auriculata* F. & W. *minutisecta* F. &

W. *foliosa* F. & W. *lescuriana* F. & W. *pachynervis* F. & W. *hastata* F. & W.—**Neuropteris** *flexuosa* Bgt. *dictyopteroides* F. & W. *auriculata* Bgt. *odontopteroides* F. & W. *fimbriata* Lesq. *cordata* Bgt.—**Odontopteris** *nervosa* F. & W. *pachyderma* F. & W. *densifolia* F. & W.—**Callipteridium** *dawsonianum* F. & W. *oblongifolium* F. & W. *granaifolium* F. & W. *odontopteroides* F. & W. *unitum* F. & W.—**Pecopteris** *arborescens* Schlt. *candolleana* Bgt. *elliptica* Bunb. *pennæformis* (var. *latifolia* F. & W.) *miltoni* Artis, *dentata* Bgt. *pteroides* Bgt. *pluckeneti* Bgt. *constricta* Bgt. *germari* (Weiss) F. & W. *crassinervis* F. & W. *cuspidata* F. & W. *subfalcata* F. & W. *rarinervis* F. & W. *imbricata* F. & W. *asplenioides* F. & W. *rotundifolia* F. & W. *platynervis* F. & W. *rotundiloba* F. & W. *schimperiana* F. & W. *pachyopteroides* F. & W. *angustipinna* F. & W. *heeriana* F. & W. *tenuinervis* F. & W. *merianispteroides* F. & W. *latifolia* F. & W. *inclinata* F. & W. *goniopteroides* and three others undetermined F. & W.—**Goniopteris** *emarginata* Goepp. *elegans* Germ. *longifolia* Bgt. *arguta* Bgt. *elliptica* F. & W. *oblonga* F. & W. *newberryana* F. & W.—**Cymoglossa** *obtusifolia* F. & W. *breviloba* F. & W. *formosa* F. & W. *lobata* F. & W.—**Alethopteris** *virginiana* F. & W.—**Tæniopteris** *lescuriana* F. & W.—**Rhacophllyum** *filiciforme* var. *majus*, F. & W. *laciniatum* F. & W. *lactuca* Sternb. *speciocissimum* Schimp.—**Caulopteris** *elliptica* F. & W.—**Sigillaria** *approximata* F. & W. *brardii* Bgt.—**Cordaites** *crassinervis* F. & W.—Somethiug like **Aphlebia** *patens* Gein.—**Rhabdocarpus** *oblongatus* F. & W.—**Carpolithes** *bicarpa* F. & W. *marginatus* F. & W.—**Gulielmites** *orbicularis* F. & W. **Saportea** (n. g.) *grandifolia* F. & W. *salisburioides* F. & W. The best collection has been made at Carmichael's, Greene county, Pa. where superb specimens abound in vast numbers and fine preservation in the roof shales of the *Main Waynesburg Coal*, under the great sandstone, K, 132, 133; as also in W. Virginia, K, 59; also in Dunkard Creek, K, 103; infinitely numerous and admirably preserved, in the ravine at Hewston's mines, Cumberland township, Greene Co.. K, 128; finely preserved at Guseman's bank, K, 131; a poorer place is near Brown's Run, German, Fayette, K3, 305.—Poorly preserved leaves can be found in the lower clay parting of the bed, near Jefferson College, K, 139.—*XV.*—In the lower part of the series, rude fragments of plants and *Chunks of Coal* lie in the massive sandstone stratum over the *Pittsburgh Coal bed* near Gray's landing on the Monongahela, K, 137.—Plant impressions, mostly well preserved, are numerous in the dark shale bed No. 6 of the Peters' Creek section, near Morrison's, 140′ beneath the *Redstone coal bed*, Union, Washington Co, K, 221.—Plant fragments are abundant in the floor; and plants, lamellibranch shells, and fish remains are mingled in the roof of the *Redstone Coal* at Cannonsburg, K, 236.—*XV.*

Plants of the *Washington group* (*Upper Barren Measures*) figured in PP:—400 feet above the Waynesburg bed, *Neuropteris dictyopteroides* F. & W. *N. auriculata* Bgt. *N. flexuosa*, *Odontopteris rarinervis; Callipteridium oblongifolium*, *Pecopteris integripinna* (400′ to 600′) *P. ovoides* F. & W. *P. lanceolata* F. & W. *P. latifolia* F. & W.—500′ above Waynesburg Coal *Odontopteris pachyderma* F. & W. abundant; *Alethopteris gigas* Gein.—800′ above Waynesburg coal, *Goniopteris emarginata* Goepp.—At all heights from Waynesburg coal nearly to top of the series *Pecopteris pluckeneti* Bgt.—In addition to the above, *Tæniopteris newberriana* F. & W. near *Macrotæniopteris rogersi* Schimp. of the Richmond Triassic coal. *T. newberriana* var. *angusta*, ditto. *Caulopteris gigantea* F. & W. some specimens one and a half feet broad. *Baiera virginiana* F. & W.

Plants, carbonized, in fragments, crowd the shaly laminated sandstone, under the *Washington Coal* at Waynesburg, K, 54, 150; on Ten Mile Creek, K, 190; in Canton township, K, 245.

Plants in the roof shales of the *Washington Coal* (Upper Barren measures) figured and described by Fontaine & White, Report PP, 1880. *Annularia minuta* Bgt. *Sphenopteris coriacea* F. & W. *Callipteris conferta* Sternb. *Pecopteris arborescens* Schlot. very abundant.

Plants, macerated to a mere skeleton, occasionally appear in the black fish-bed shale over the *Washington Coal*, K, 50; and with bivalve crustaceans in Limestone No. 2 at Ten Mile village, Morris, Washington county, K, 188.

Plant leaves, macerated, occasionally appear with the many fish and crustacean bivalves, and univalve shells, in the black shale, 110′ beneath the *Jolleytown coal*, on Limestone No. 3, at Mosier's RR. cut, Nottingham, Washington, K, 225.

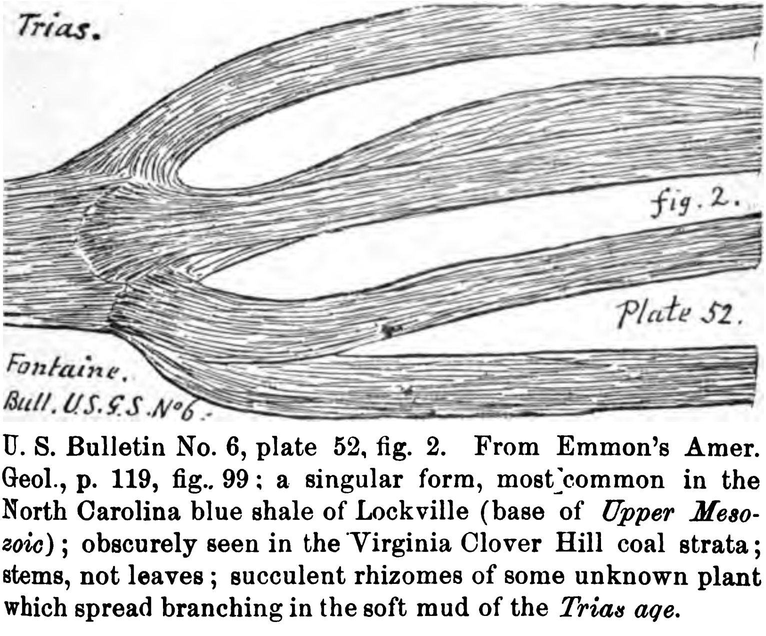
Plants numerous in roof shales of the *Dunkard coal*, over Limestone No. 9, K, 42.

Plant leaves in Limestone No. 10, K, 41.

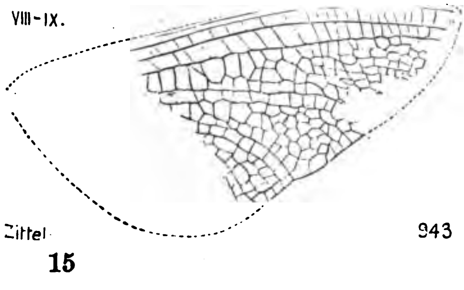
Plant bearing shale in well, near Limestone No. 11, K. 39.

Plant impressions in shale over *Gilmore sandstone*, the highest in south-western Pennsylvania, under Limestone No. 14, K, 110.

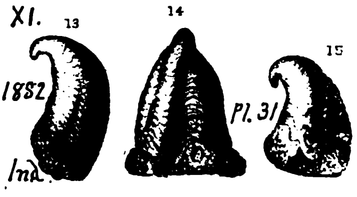
Plant of Triassic age, of unknown alliance. Fontaine in U. S. Bulletin No. 6, plate 52, fig. 2. From Emmon's Amer. Geol., p. 119, fig.. 99; a singular form, most common in the North Carolina blue shale of Lockville (base of *Upper Mesozoic*); obscurely seen in the Virginia Clover Hill coal strata; stems, not leaves; succulent rhizomes of some unknown plant which spread branching in the soft mud of the *Trias age*.


Trias.
fig. 2.
Plate 52.
Fontaine.
Bull. U.S.G.S. N°6.

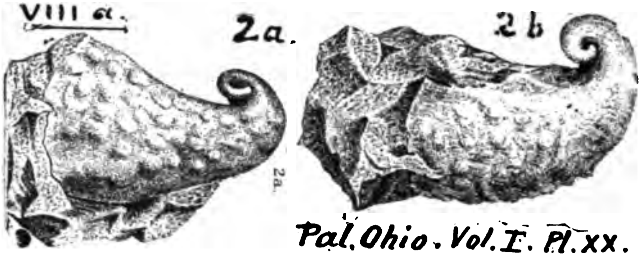
Platephemera antiqua, Scudder. A flying insect from the Devonian rocks of St. John, N. B., Canad. Nat. [2] Vol. 3, 1867, p. 205, fig. 2.—*VIII? IX?* Figure taken from Zittel's Handbuch, p. 759, fig. 943, *natural size*.—*VIII-IX*



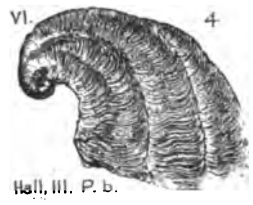
Platyceras acutirostre. (*Capulus acutirostris*, Hall, Trans. Alb. Inst. Vol. 4, 1856, Iowa Rt. 1859, pl. 23, fig. 14. Whitfield, Bull. 3, Amer. Mus. 1882, pl. 8, figs. 13, 15,) Collett's Indiana Rt. 1882, p. 370, pl. 31, figs. 13, 15. *XI.* Subcarboniferous formations at Spergen Hill, etc. Indiana.—Recognized, doubtfully, by Heilprin among the anthracite black shale fossils of the Wilkes-Barre neighborhood, owned by the Wyoming Hist. Soc. See Geol. Sur. Pa. An. Rt. 1885, p. 451.—XIII.



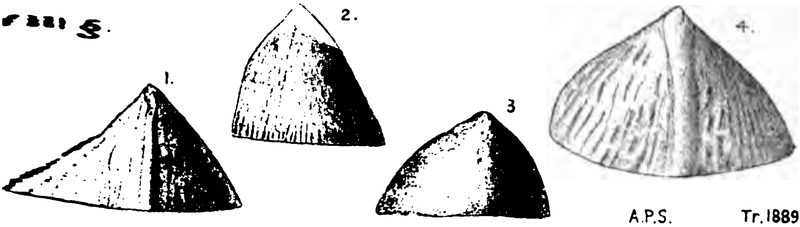
Platyceras attenuatum, (? *P. dumosum*, Conrad.) Hall, 13th Regents' Rt. 1859; 15th Report, 1862, p. 19.—Meek's species, with same name, was described in Proc. Acad. Nat. Sci. Phila. 1871, p. 75. Also in Pal. Ohio, Vol. 1, 1873, page 212, plate 20, fig. 2*a* internal cast, showing little nodes which occupied depressions on the inner surface of shell corresponding [this however is Meek's species; different from Hall's] to the cases of spines on its unknown outside surface ; 2b, another cast. A peculiarity of the shell, the twisting of the apex nearly at right angles sidewise, distinguishes it from *P. domosum*. It resembles the non-spiny *P. reflexum* of the *Oriskany sandstone.* Columbus, O. *Corniferous limestone. VIII a.*—In Pennsylvania collections, Cat. OOO, Claypole's spec. 5–75, 94–45, 198–10–12.


VIII a.
2a.
2b
2a
Pal. Ohio. Vol. I. Pl. XX.

Platyceras bisulcatum. Hall, Palæontology of New York, Vol. 3, 1859, p. 310, fig. 4, from the *Lower Helderberg formation* in New York.— *VI.* [In Pennsylvania, C. E. Hall names it in his MS. report of collections, Dec. 30, 1876, from ***Marcellus*** and *Hamilton* strata.— *VIII b, c.*]

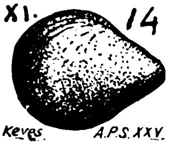


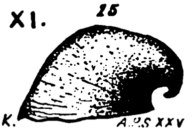
Platyceras breve, *new species*, Simpson, Trans. Amer.



Phil. Soc., Phila., 1889, p. 454, fig. 23, 1, dorsal view; fig. 2, side view; fig. 3 front view; fig. 4 dorsal view of another specimen. Species based on Randall's specimen 9504 A, of his collections near Warren, Pa. Shell of medium size, apex not incurved; body straight; rapidly increasing in size; width at the base equal to the length of the anterior side; length of the posterior side from two-thirds to four-fifths that of the anterior; both sides convex; on the anterior side there is a prominent subangular elevation, commencing at the apex and continuing to the base; on each side of the carina a slight depression; other portions of the shell without plications or elevations. Aperture circular; peristome, as far as can be ascertained, not sinuous. Sufrace marked by elongate pustules, subregularly arranged, giving to the surface the appearance of being coarsely striated, three in the space of 5 mm. There are also faint indications of concentric striæ. A specimen of average size measures as follows: Diameter of aperture 23 mm.; length of the anterior side 20 mm.; of posterior 15 mm.; height 15 mm. The characteristics of this species are the short conical form, the rapid enlargement from the apex to the base, and the elongate pustules of the surface. From those species having a carina it is distinguished as follows: from *Platycerus carinatum* by its conical form, the straight apex, the absence of plications and the non-sinuosity of the peristome; from *Platyceras mitelliform* by its larger size, conical form and the ornamentation of the surface; from *Platyceras conicum* by its shorter form and the absence of conspicuous plications and the consequent non-sinuosity of the peristome. It most closely resembles *Platyceras dorsale* of this formation, but it is shorter, much less oblique; posterior side straight or convex; the apex more central and does not project beyond the base, while in that species the apex projects beyond the base a distance nearly equal to half the diameter of aperture. *Chemung VIII g.*

Platyceras capax, Keysr American Philosoph. Soc. Phila. Vol. 25, No. 128, p. 242, fig. 14. *Subcarboniferous limestone. XI.*





Platyceras carinatum, Hall. 15th. An. Rt. 1862. *Upper Helderberg.*—In Pennsylvania collections, Cat. OOO, and Claypole's Report F, 2, preface; Specimens 5–44 (and a cast of it); 5–45; 5–86; 216–7,–8. Spec. 801–16, in Chance's coll. on Marshall's creek. *Hamilton, VIII c.—See Appendix.*

Platyceras chesterense. See *Pteratocrinus acutus.*

Platyceras (*Orthonychia*) **conicum,** *Var.* **chemungense,** *new variety,* Simpson Trans. A. P. S. Phil. Dec. 1889, founded on 9471, 9504 of Randall's coll. at Warren, Pa.— *VIII g.*

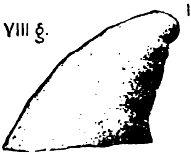
Platyceras conicum, var. **inflectum,** reported by I. C. White, among the forms at Mapleton, Huntingdon Co., Pa., in beds below the middle of the *Oriskany sandstone.* (T3, p. 119.) See cat. OOO, 1888, p. 57, spec. 200-9 (four).—*VII.*

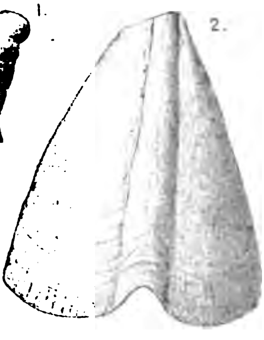
Platyceras conicum, var. **inornatum,** Mapleton, Pa. *Oriskany sandstone.* (T3, 119) Spec. 200—7 (two).—*VII.*

Platyceras cymbium, Hall, 15th An. Rt. 1862, Upper Helderberg.—Found in Monroe Co., Pa., Chance's collections on Marshall's creek, in "*Hamilton strata,*" *VIII c.*

Platyceras dumosum *Figure with* **P. undatum.**

Platyceras dorsale, Simpson. *New species.* Trans. Am. Phil. Soc., Phila., 1889. page 454 fig. 24, 1 side view; fig. 2, dorsal view; based upon Randall's specimen 9504 B, of his collections near Warren, Pa.—Shell obliquely subconical; anterior side curved; posterior straight or concave; apex not incurved, laterally compressed; body of





A.P.S. Tr. 1889

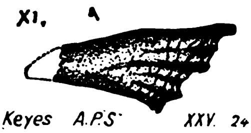
the shell regularly increasing in size, rounded; width at the base equal to three-fourths of the length of the anterior side; length of the posterior side one-half that of the anterior; right and left side usually equally developed, but on one specimen the right side has a little the greater development. On the anterior side there is a conspicuous rounded or subangular elevation extending from the apex to the base; on the posterior side is an elevation beginning at about one-half the length of the side from the apex, and continuing to the margin; on each side of this elevation a comparatively broad shallow depression, of the same extent as the elevation. Aperture circular; peristome slightly sinuous at the elevations. Surface marked by fine radiating lines; at the base there are three in the space of 1 mm., above they are much more closely disposed; the radii are crossed by fine concentric striæ; the surface presenting a cancellated appearance when the specimen is well preserved. One specimen measures as follows: Length of the anterior side 32 mm., of posterior 18 mm., height of shell 18 mm. Another specimen, which probably belongs to the same species, is flattened, but that may be due to pressure; it measures as follows: Length of the anterior side 45 mm., of the posterior 22 mm., width at the base 35 mm.; height of shell 18 mm. This species most closely resembles *Platyceras breve* of the same locality, but the anterior side is much longer and the posterior side proportionally shorter, the shell more oblique and not so regularly conical; it has an elevation and two depressions on the posterior side, and the surface has fine radiating striæ, the surface of *P. breve* being marked by elongate pustules; from *Platyceras striatum* it may be distinguished as follows: It is more oblique, the posterior and anterior sides are more unequal, and it is without the conspicuous plications characteristic of that species. It resembles *Platyceras mitelliforme* in having a prominent carina, but is a larger form and the apex is not bent or incurved. From *Platyceras conicum* it may be distinguished by the absence of conspicuous plications; and from *P. carinatum* by the straight apex and the absence of conspicuous plications —Three miles northwest of Warren, Warren county, Pennsylvania.—*Chemung upper beds. VIII g.*

Platyceras equilaterum, encrusted with *Platycrinus hemisphericus*, which see for figure.

Platyceras equilaterum, encrusted with *Ollacrinus tuberosus*, which see for figure.

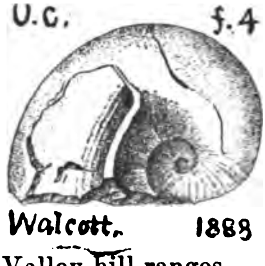
Platyceras erectum (*Acroculia erecta*, Vanuxem). Hall Report on Western District of New York, 1843, page 172, fig. 8, 6. [36] 9. *Upper Helderberg.* Recognized in specimen 807–12 of Fellows' and Genth's collections, 1875, on Kintner's farm, 1 m. S. W. of Marshall's Falls, Monroe Co., Pa., from *Hamilton*, *VIII c.* [So reported by the collectors.]

Platyceras expansum. See **Strophostylus expansus.** VI.

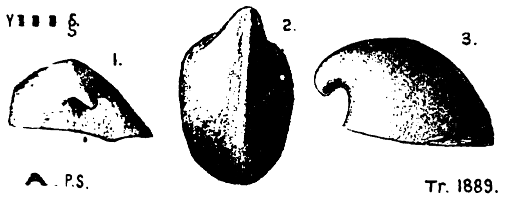


Platyceras formosum, Keyes. American Philosophical Society, Phila., Vol. 25, No. 128, 1888, page 142, fig. 9. For a specimen of this shell on which a stone lily had grown, see figure under **Dorycrinus.**—*Subcarboniferous limestone. XI.*

Platyceras gebhardi, Conrad. Annual Report of New York Survey, 1840, *Lower Helderberg* and *Oriskany.*—Occurs south of Carpenter's point on the Delaware, in sandy shales which there represent the *Oriskany.* (White's Rt. on Pike Co., G6, p. 123.) Also identified by Dr. Barrett, of Port Jervis, among the forms, which crowd the *Lower Helderberg* (*Stormville*) *shales.* (G6, p. 132).—*VI, VII.*



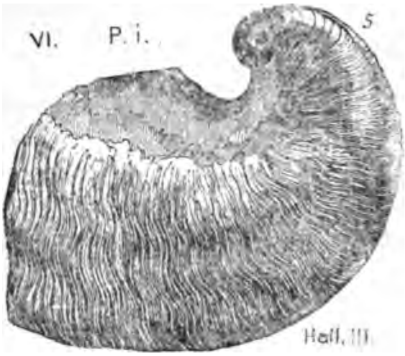
Platyceras hoyti. Walcott, Potsdam Fauna of Saratoga Co., N. Y., 1888, fig. 4. See Bull. 30, U. S. G. S. p. 62.—U. C. Upper Cambrian (Potsdam) formation, and this species confined to it, but other species of Platyceras occur in the Middle Cambrian.—To be looked for in Pennsylvania along the north and west flank of South Mountains, and North and South Chester Valley hill ranges.



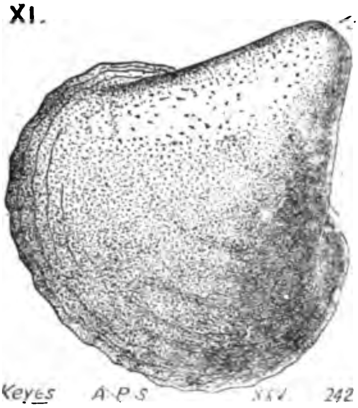
Platyceras inæquale, *new species*, Simpson, Trans. Am. Phil. Soc. Phila., 1886, p. 456, fig. 25, 1, front view; fig. 2, dorsal view; fig. 3, side view. Based upon Randall's specimen 9472 A, C, of his collections near Warren, Pa.—Description: Shell small, subangularly ovate; apex minute, incurved, making less than one turn, very thin and angular; inclined or twisted to the right. The body of the shell expands rapidly; anterior side curved, sometimes forming nearly half a circle; posterior side also curved, but in a lesser degree; width of base from one-half to three-fourths the length of the anterior side; posterior side one-third the length of the anterior. The left side is flattened or only very slightly convex, and is often nearly or quite at right angles to the base, making a sharp angle or ridge between the side and the back of the shell. The right side is convex and much more developed than the left. In front the shell becomes flattened near the margin. On the left side, about half way between the base and angular carina, there is a low, rounded ridge, commencing near the apex and continuing the length of the shell, though this feature in many of the specimens is obscure. Aperture circular or broadly oval. Most of the specimens observed are casts or macerated so that the surface characters are obsolete. On some of the specimens there are evidences of strong radiating striæ or elongate pustules, and when well preserved there are numerous concentric striæ. The characteristics of this species are the pinched appearance of the apical portion, and its inclination to the right, and the much greater development of the right side; in the latter feature it resembles *Platyceras cymbeum*, but is a much smaller shell, and the plications are very much less prominent; from *Platyceras mitelliforme* it may be distinguished by the inequality of its sides, in that species the prominent ridge being in the middle of the shell, both sides being equally developed. Four miles northwest of Warren. *Chemung upper beds. VIII g.*

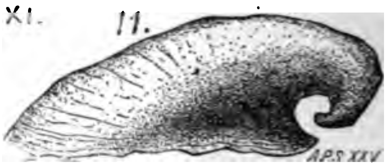
Platyceras infundibulum, encrusted with *Platycrinus hemisphericus*, which see for figure.

Platyceras intermedium. Hall, Palæontology of New York, Vol. 3, 1859, woodcut fig. 5; from the Lower Helderberg formation, in New York.—*VI.*



Platyceras latum, Keyes. Amer. Philos. Soc. Phila., Vol. 25, No. 128, 1888, p. 242, fig. 10, 11, *Subcarboniferous limestone. XI.*

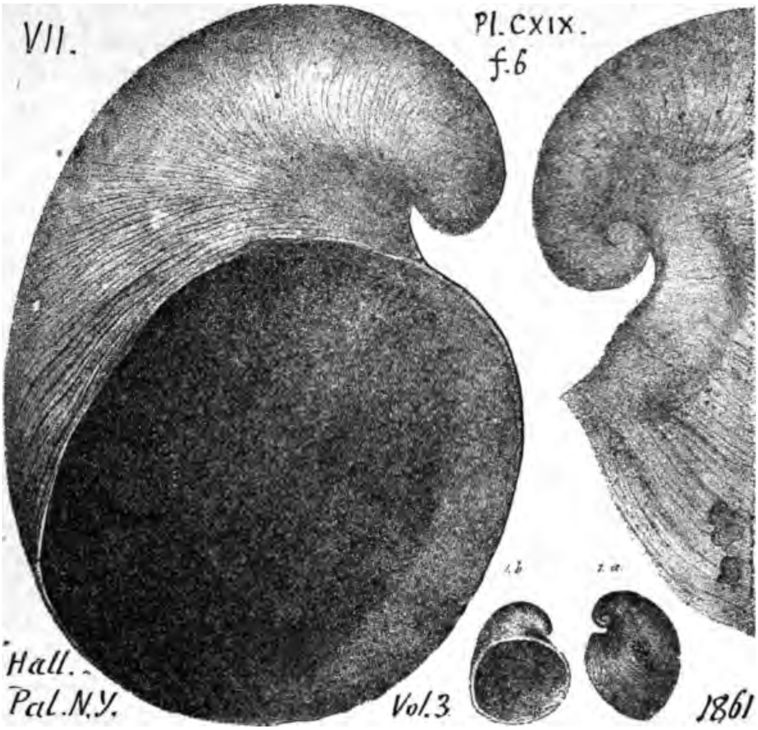

XI.
Keyes A P S XXV 242



Platyceras lodiense, Meek, (*Orthonychia lodiensis*). Proc. Acad. Nat. Sci. Phila., 1871, *Waverly.*—Pal. Ohio, Vol. 2, 1875, p. 313, pl. 13, fig. 1 *a*, *b*, side and top views of a *Lower carboniferous* (*Waverly*) shell, which is not a true *Platyceras*, but in Meek's opinion more nearly allied to the *Orthonychia* section of *Platyceras* than to the very differently ornamented *Cyrtolites* (type *ornatus*). Lodi, O.—*Pocono*, *X.*

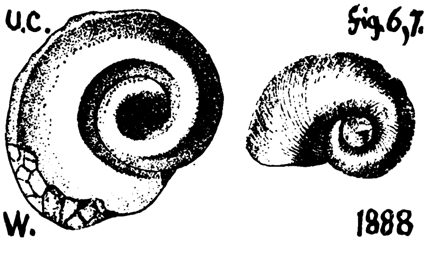
Pal. Ohio, Vol. 2.
Pl. XIII,

Platyceras magnificum, Hall. Pal. N. Y. Vol. 3, 1861,

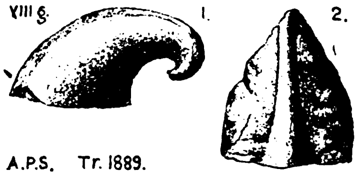


page 476, plate 119, figs. 1 *a*, *b*, young shell; 6 *a*, *b*, large specimen, symmetrical and well-preserved; with the whorls free except at the extreme tip, and figured *natural size*. *Oriskany sandstone* of New York.—In Penna. found by I. C. White in Montour Co., Cooper township, Grove's tunnel, in *Oriskany sandstone*. (G7, p. 86, 297) Claypole's spec. 95-1.—*VII.*

Platyceras minutissimum. Walcott. Potsdam Fauna, Saratoga Co., N. Y., 1888, figs. 6, 7. See Bull. U. S. G. S. page 62.—*Upper Cambrian* (*Potsdam*) *formation.* To be sought in Pennsylvania along the north and west side of the South Mountains.—*I.*



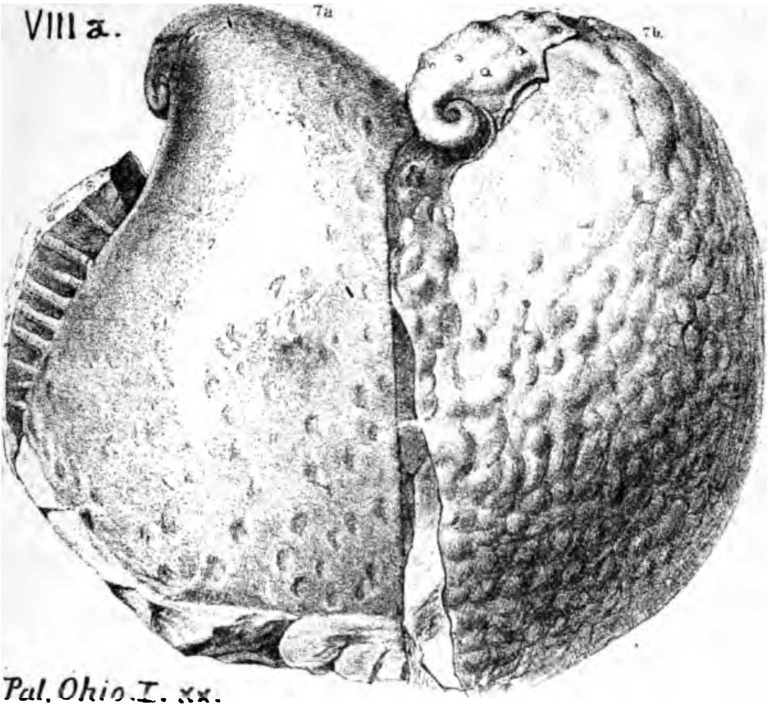
Platyceras membranaceum, Ringueberg, Bull. Buffalo S. N. S., Vol. 5, 1886. *Niagnra. V b.*



A.P.S. Tr. 1889.

Platyceras mitelliforme, *new species*, Simpson Trans. Amer. Phil. Soc. Philada. 1889, page 456, fig. 26, 1, side view, fig. 2, dorsal view. Shell small, obliquely arcuate from the base; apex incurved, making part of one volution; below which the body volution rapidly increases in size. Width at the base equal to three-fourths the length of the anterior side; length of the posterior side less than one-half of the anterior; right and left sides equally developed. Anterior side convex, with a prominent, broad, rounded carina along the middle; on each side of the carina, towards the base, a shallow depression. On some of the specimens there are indications of very slight plications on the posterior side. Aperture oblique, broadly elliptical; peristome a little sinuous at the carina, and sometimes slightly sinuous, corresponding with the faint folds of the posterior side. Surface marked by concentric lines and by broad undulations, which sometimes give to portions of the shell a lobed appearance. A specimen of about the average size measures as follows; Height 12 mm.; length of the anterior side 25 mm.; of the posterior 8 mm.; width at base 22 mm.; thickness 18 mm. The characteristic feature of this species is the prominent carina or elevation along the dorsum. It may be distinguished from *Platyceras inequale* of this formation by its somewhat larger size, the prominent carina, and the equal development of the right and left side; from *Platyceras dorsale* by its smaller size, its flattened form (a transverse section being oval), and by the partial volution of the apex; from *Platyceras* (*Orthonychia*) *striatum* by its arcuate form, the prominent carina and the absence of conspicuous plications; from *Platyceras carinatum* by the equal development of the right and left sides, and the absence of conspicuous plication; from other species at present known, by its small size, decidedly curved form, and prominent carina.—In Pennsylvania near Warren, in *Chemung upper beds. VIII g.*

Platyceras multisinuatum, Hall, Pal. N. Y., Vol. 3, 1859. *Lower Held. VI.*



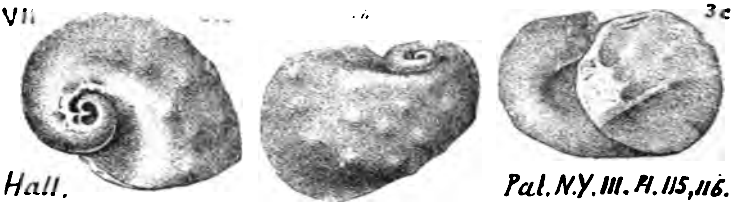
Platyceras multispinosum, Meek. Proc. Acad. Nat. Sci. Philada, 1871. *Corniferous limestone.*—Pal, Ohio, Vol. 1, 1873, page 210, plate 20, fig. 7 *a*, internal cast, showing irregularities corresponding to the spines of the exterior, some remains of the bases of which are seen in a part of the matrix remaining attached to the left side of the specimen. (This figure is defective, in having the nodes marking the position of spines too much like *pits*, and very much too scattering.) 7 *b*, profile of another specimen, also a cast of the interior, with a little of the shell near the apex remaining. It is not turned so as to show the greatest length of the shell, which grew larger than *P. dumosum*, Conrad, more oblique, more expanding, and more numerously spined, 200 to 100 on the largest specimens. Nearer *P. echinatum*, Hall, a *Hamilton* species. Spines needle like, tubular (as in *Productus*), but not communicating with inside of shell, except near lip. *VIII a.*

Platyceras naticoides, Eth., 1878. *VI.*

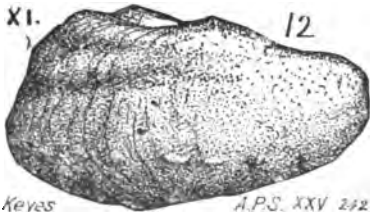
Platyceras newberryi, Hall, 1859. *VI.*

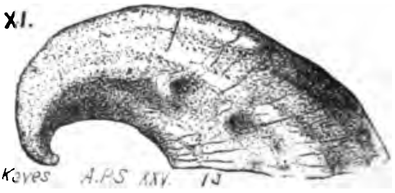
Platyceras nebrascense. (Meek. Nebrask. U. S. Survey, 1872, p. 227, plate 4, fig. 15 *a*, *b*.) Collett's Indiana Rt. 1883, page 159, plate 32, figs. 15, 16, *natural size*, opposite sides of a specimen growing on a crinoidal stem. From Indiana to New Mexico; *Upper Coal Measures*. *XV.*

Platyceras nodosum, Conrad. Annual Report of New York Sur., 1841. *Oriskany*. *VII.* Hall, Pal. N. Y. Vol. 3, 1859, page 472, plate 115, selected figs. 3 *a*, *b*, *c*, a young specimen which has kept the proper form of the shell. Other figures show specimens three times as large. All the specimens are casts, with sometimes impressions of the exterior. The nodes or knobs are casts of depressions on the inside surface, where spines projected from the outside of the shell. In nearly all the larger specimens the apex is broken off leaving only the large whorl or a part of it. Possibly the apex became solid in later life and therefore could not have an internal cast. Found at many places along the *Oriskany* outcrop in N. Y.—In Pennsylvania, C. E. Hall, at Marshall's Creek, Monroe Co., OO, 804–41, *Hamilton*. *VIII c*. [?]



Platyceras obliquum, Keyes. Amer. Philos. Soc. Philada. Vol. 25, N. 128, 1888, page 242, figs. 12, 13. *Subcarb. L. XI.*



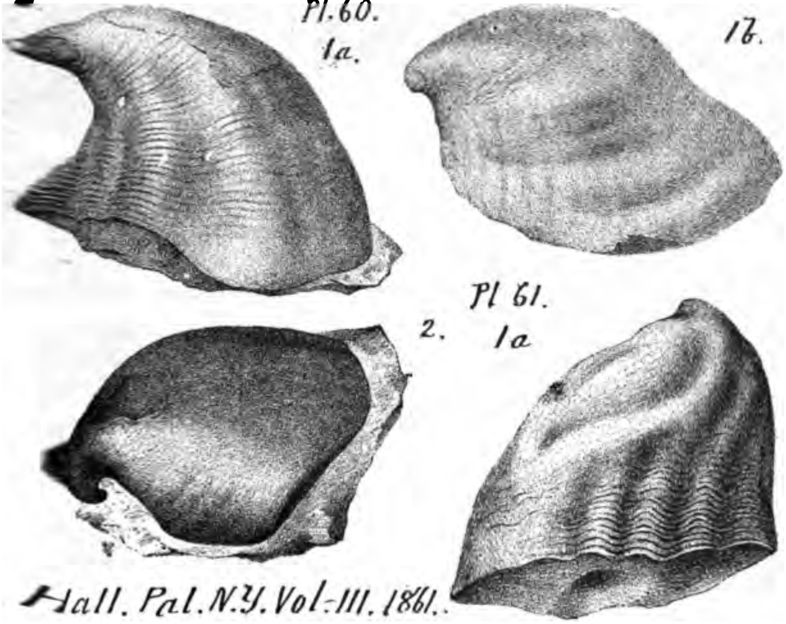


Platyceras paralium, White & Whitfield. Proc. Boston Soc. Nat. Hist. Vol. 8, 1862. *Kinderhook limestone* (*Subcarboniferous*) of the Mississippi valley. (Name means, "that grows by the seaside." S. A. Miller.) In Pennsylvania reported abundant in the *LeBœuff conglomerate* (*3d oil sand*) of the Erie county quarries, and characteristic of that stratum, by I. C. White, Report Q4, pp. 110, 249.—*Upper Chemung*, if not *Catskill*. *VIII-IX*.

P. patulum, Hall; *pentalobus*, Hall; *perlatum*, Hall; *perplexum*, Hall; *perplicatum*, Hall; *pileiforme*, Hall; *piso*, Walcott. (S. A. Miller, 1890.)

Platyceras parasiticum, attached to *Cromyocrinus simplex*, which see for figure.

Platyceras platystoma, Hall. Pal. N. Y. Vol. 3, 1859, v.



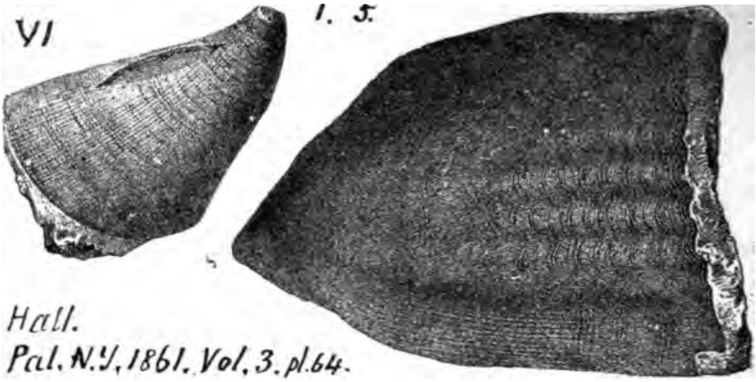
Hall. Pal. N.Y. Vol. III. 1861.

Page 326, plate 60, fig. 1*a*, right side, *1b*, cast, preserving impressions of plications; 2, irregularity at apex, plications only shown on one side; plate 61, fig. 1*a*, left back side, crushed on upper side. (Other figs. omitted.) In *Delthyris shaley limestone* of the *Lower Helderberg*. *VI*.—With it occurs its *variety*, **alveatum**, Hall.) In Pennsylvania, Claypole's catalogue in OOO, 1888, specimen 200–6 (two), was found at Mapleton, Huntingdon Co. glass sand quarries of *Oriskany. VII.*

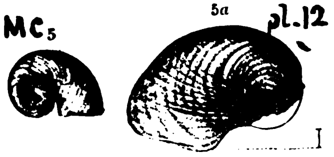
Platyceras platystoma, Var. **alveatum**, Hall, Pal. N. Y. III, 1859. *Lower Held. VI.*

Platyceras plicatile, Hall, III. *L. Held. VI.*

Platyceras plicatum, Hall. Pal. N. Y. Vol. 3, 1859, p. 334, pl. 64, fig. 1, a young specimen in which the plications have not yet been developed; fig. 5, a large specimen widened unnaturally by pressure; from the *Delthyris shaley limestone* of the *Lower Helderberg. VI.* — In Pennsylvania, collection by C. E. Hall, spec. 703–14 (two) from Royer's ridge, north of the road-crossing at Orbisonia, Huntingdon Co. (OO, 1875), *Oriskany.* Also Claypole's catalogue (in OOO) names as a variety *P. planum*, specimen 200–10, from the glass sand quarries of Mapleton, Huntingdon Co. *Oriskany. VII.*



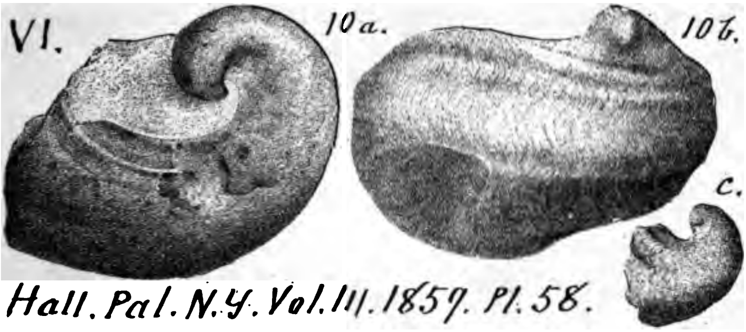
Platyceras primævum, Billings (1881, Can. Nat. V1, 220) Walcott, Bulletin No. 30, U. S. G. S. page 130, plate 12, fig. 5 cast, right side; 5 *a* left side, *enlarged* to show characters of outside surface of shell. *Lower Cambrian* conglomerate limestone at Troy, and below Quebec. *L. C.*



Platyceras primordiale, Hall, 16th Rt. N. Y. 1863, *Potsdam sandstone. I.*

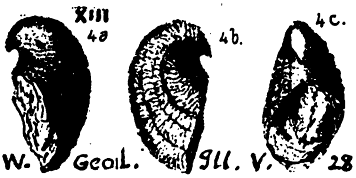
P. proclive, Ring.; *pyramidatum*, Hall; *quincyense*, McChes.; *quinquesinuatum*, Ulrich. (S. A. M.)

Platyceras retrorsum, Hall. Pal. N. Y. Vol. 3, 1859, p. 320,

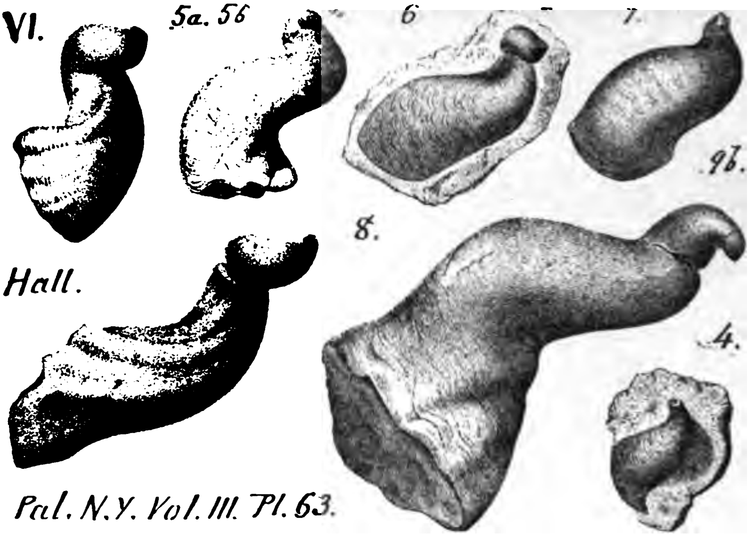


pl 58, fig. 10*a*, upper part of spire, shell worn smooth and partly gone; *b*, profile showing elevated apex; *c*, young, imperfect. Found in shaley limestone of the *Lower Helderberg*. *VI.* (Among the specimens are some so different that Hall established as a variety *P. abnorme.*) Dr. Barrett has collected it on the Delaware river below Port Jervis, from I. C. White's *Stormville shales* above and *Stormville limestone* beneath the *Stormville conglomerate* of Pike and Monroe counties. G6, pp. 132, 134.—*VI.*

Platyceras spinigerum, Worthen, Geo. Sur. Ill. Vol. 5, 1873, page 594, plate 28, figs. 4*a*, side view of the shell, showing the spine bases; *4b*, view of the opposite side of the shell; *4c*, profile view, showing the aperture. Distinguished from all other *Coal measure* species by groove (sinus) like long depressions and the spines on its surface. Brighton, Ill., roof shale of Coal No. 6. *XIII?*



Platyceras spirale, Hall, Pal. N. Y. Vol. 3, 1859, page 334, plate 63, fig. 4, a young one yet without plications; 5*a*, *b*, a larger one, with some strong plications; 6, plications partially developed, or only shown by waves of the striæ; 7, one smooth in front and plicated a little behind; 8, larger and strongly plicated; 9*b*, back of another, a little compressed. Found in the slaty beds of the New York *Lower Helderberg*. *VI.*—In Pennsylvania recognized by Claypole at various outcrops of the *Lower Helderberg chert beds*, just under the *Oriskany*, in

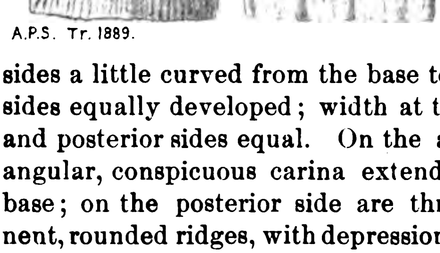


Pal. N.Y. Vol. III. Pl. 63.

Perry Co. See Cat. OO), specimen 11-7 (two.)—*VI-VII.*

Platyceras squalodens, Whitfield, Ann. N. Y. Acad. Sci., Vol. 2, 1882. *Upper Helderberg*, *VIII a.*

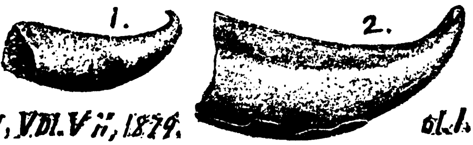
Platyceras striatum, *new species*, Simpson, Trans. Amer. Phil. Soc. Philadelphia, 1889, page 457, fig. 27, 1, dorsal view, fig. 21, front view. Based on Randall's specimen 950-4 C of his collections near Warren, Pa.—Shell subconical; apex not incurved or bent body essentially straight; sides a little curved from the base to the apex; right and left sides equally developed; width at the base, length of anterior and posterior sides equal. On the anterior side is a narrow, angular, conspicuous carina extending from the apex to the base; on the posterior side are three oblique, broad, prominent, rounded ridges, with depressions between them, which are wider than the ridges. Aperture oval. The bases of all the specimens observed are attached to the rock so that the form of the peristome cannot be definitely ascertained. Surface marked by comparatively strong, radiating striæ, which are

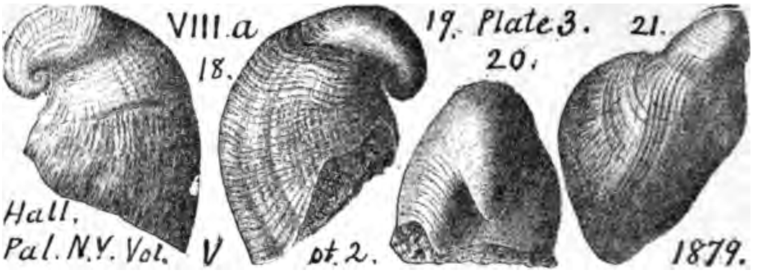


A.P.S. Tr. 1889.

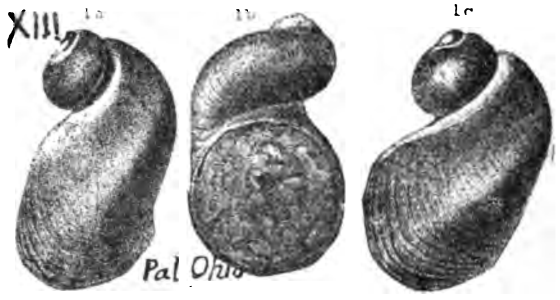
sometimes continuous, at other times interrupted, then having the appearance of very elongate pustules; at the base about six in the space of 5 mm. No concentric striæ have been observed, though it is possible that they exist on more perfectly preserved specimens. A typical specimen measures as follows: Width at the base 30 mm.; thickness 20 mm.; height 30 mm.; width of sides equal; width of ridges on posterior side 3 mm.; of depressions slightly more; of carina 3 mm. This form resembles the two specimens which are figured in the Pal. of New York, Vol. V, Pt. II, Pl. 1, Figs. 20–23, which differ materially from the other figured specimens placed under that species. The other specimens, though perfectly preserved and showing concentric striæ, have no indication of radiating striæ, while in the specimens described they are one of the most characteristic features; they are also shown in the figures mentioned above. The plications are also stronger and the form more regularly conical. This species resembles *P. striatum* from this formation, but may be easily distinguished by its straight form, the equal length of the sides, the coarser striations, and the strong plications of the posterior sides; from *P. breve* it is distinguished by its more elongate form, oval aperture, more continuous radiating striæ, and the conspicuous plications of the posterior side.—Four miles north-west of Warren, Warren county, Pennsylvania. *Chemung upper beds. VIII g.*

Platyceras (*Orthonychia*) **subrectum**, Hall, Geol. Fourth Dist. 1843, p. 172, fig. 3; 12th Annual Rt. N. Y., 1859; Pal. N. Y. Vol. V, ii, 1879, page 1, plate 1, figs. 1, small specimen with no shell at all; 2, concave (ventral) side of a larger flat one, showing little twisting except at the point (apex); surface, concentric striæ, sometimes crowded into wrinkles; robuster and more tapering than *P. dentalium*, and not ridged lengthwise. *Upper Held. limestone* near Buffalo, N. Y. *VIII a.* — In Pennsylvania, reported by C. E. Hall in MS. report on Collections of 1876, from *Marcellus* and *Genesee. VIII b, e.*


VIII a.
U.H.L.
Hall,
Pal.N.Y, Vol.V ii, 1879.
1.
2.
pl.1.

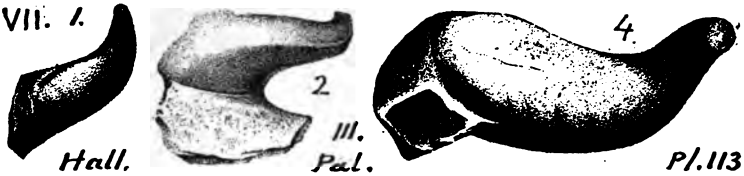


Platyceras symmetricum, Hall, 15th Regent's Report N. Y., 1862; Pal, N. Y. Vol. V, ii, 1879, page 9, plate 3, selected figs. 18, 19, 20, 21, four views of a typical specimen showing the general features of the species, fig. 20, showing the symmetrically coiled back; fig. 21, is accidentally compressed on one side; from Canadaigua lake, N. Y. *Hamilton rocks*, *VIII c*.—In Pennsylvania, Perry county, Claypole's (OOO, 1889) specimen 5–85, from W. Barnett's mill outcrop of *Hamilton shale*. *VIII c*.



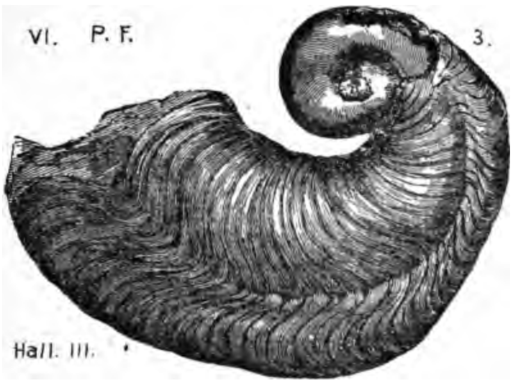
Platyceras tortum, Meek, Proc. Acad. Nat. Sciences, Phila. 1871, *Coal measures*.—Pal. Ohio, Vol. 2, 1875, page 345. plate 20, fig. 10 *a*, *b*, *c*. dorsal and ventral views of one, and dorsal view of another specimen, retaining their thin shells, true *Platyceras*, and therefore not, like the casts in Illinois, to be suspected of being distorted *Machrocheilus*.—In Pennsylvania, seen by I. C. White in the highly fossiliferous *Ferriferous limestone* of the *Allegheny coal measures*, at Shinn's quarry, Wampum, Lawrence county, Q2, 47, 106; and in Mercer county, Q3, p. 25; also in Beaver, Butler and Armstrong, Q, 62; V, 146.—*XIII*. From Stark Co., O. *Coal measures*. *XIII*.

Platyceras tortuosum. Hall, Pal. N. Y. Vol. 3, 1859, page 472, plate 113, fig. 1, 2, 4, difficult individuals of different sizes (3, 5, omitted,) all casts; surfaces unknown; very near to *P*.

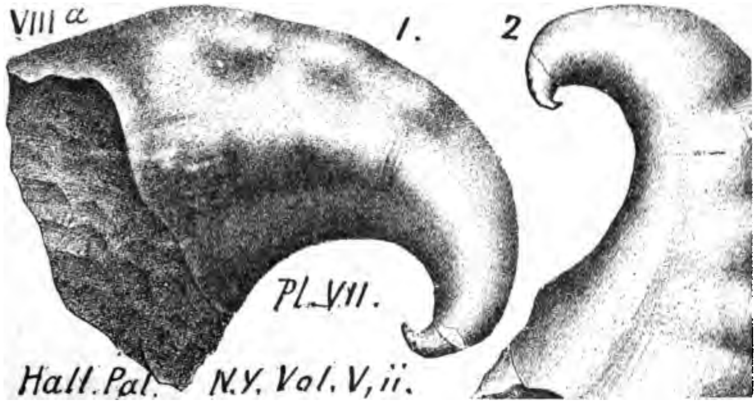


spirale; Albany and Schoharie Cos., N. Y. *Oriskany sandstone.*—In Pennsylvania, Montour county, Cooper township, Grove Bro.'s tunnel, found by I. C. White (G7, p. 86, 297) and identified by Claypole, with *P. magnificum*, and *P. ventricosum*, in *Oriskany.* Also at Mapleton, Huntingdon county, (T3, p. 119) below the middle of the *Oriskany.* *VII.*

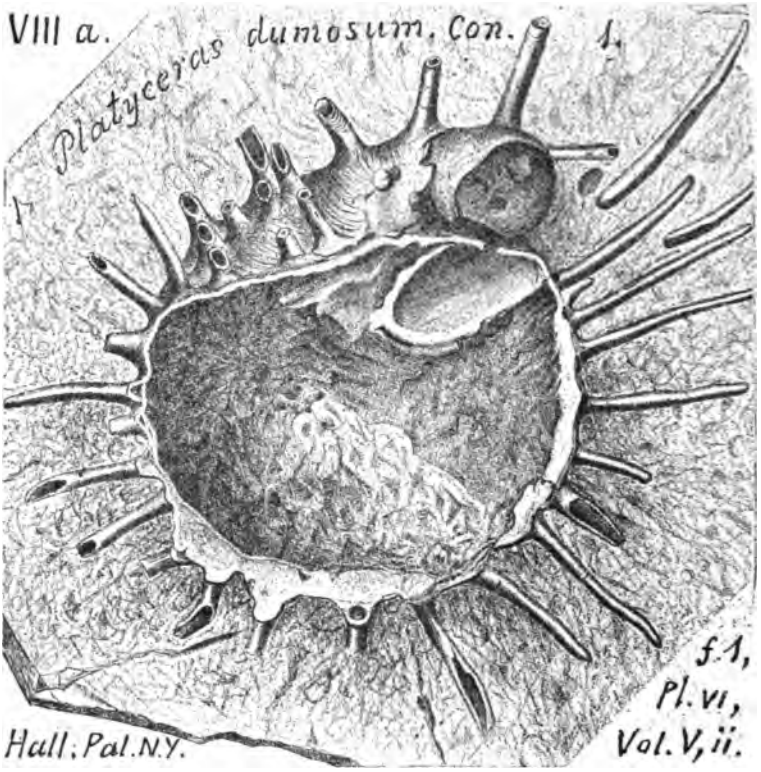
Platyceras trilobatum. Hall, Palæontology of New York Volume 3, 1859, wood cut figure 3; from the *Lower Helderberg formation* in New York. —*VI.*


VI. P. F.
3.
Hall. III.

Platyceras undatum, (*P. subnodosum of Conrad?*) Hall.


VIII a
1.
2
Pl. VII.
Hall. Pal. N.Y. Vol. V, ii.

Illust. Devon. Foss., 1876; Pal. N. Y. Vol. V, ii, 1879, page 17, plate 7, figs. 1, 2, opposite sides of an internal cast, showing cross lines of broad tubercules; former surface no doubt strongly spiny, [like Conrad's *P. dumosum*, a fine figure of which I add here from Hall, Pal. N. Y. Vol. V, ii, plate 6, fig. 1, although not yet reported found in Pennsylvania, to show how the spines were set into these shells.]—In Pennsylvania, recognized by C. E. Hall, in Spec. 807–12, of Fellows' and Genth's Collections, 1875, at G. Kintner's farm. 1 mile southwest from Marshall's Falls, Monroe county.—*Upper Helderberg limestone. VIII a.*


VIII a.
Platyceras dumosum, Con.
1.
f. 1, Pl. vi, Vol. V, ii.
Hall; Pal. N.Y.

P. undulatum, Walcott, 1885. *VIII*.

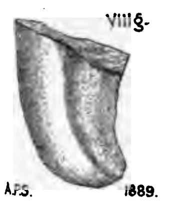
P. undulostriatum, Hall, 1859. *VI.*

P. unguiforme, Hall, 1859. *VI.*

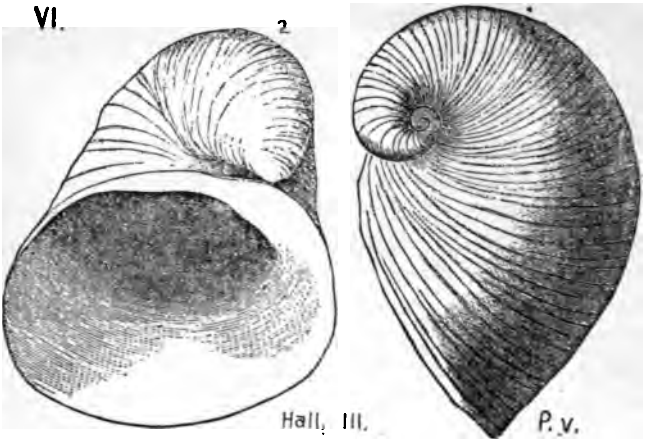
P. uniseriale, Nicholson, 1874. *VIII a.*

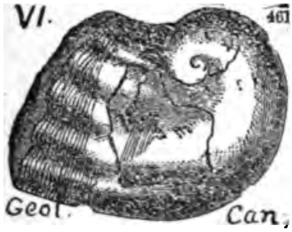
P. unisulcatum, Hall, Pal. N. Y., Vol. 3, 1859, [page 316.

Resembles *P. gebhardi. Lower Helderberg. VI.*

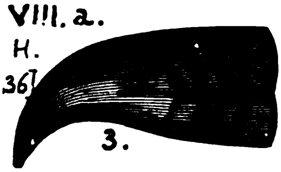


Platyceras varians, *new spec.* Simpson, Trans. Amer. Philosoph. Soc. Philada., 1889, page 458, fig. 28; species based on Randall's specimens 9471, 9472 B.—Shell small, subconical, curved, slightly oblique; apex not incurved or bent; width at the base two-thirds the length of the anterior side, and about equal to the posterior. Plications frequent, variable in number. On the dorsum there is sometimes a faint indication of a carina; on the left side is a deep conspicuous furrow, which extends about three-fourths the length of the shell from the base; beyond this there is a slighter furrow; the area between them elevated, rounded and very prominent. On the posterior side of the shell are usually two or three slight furrows, but occasionally a stronger one, and on the left side there is one nearly as strong as on the opposite side. Sometimes on the posterior side the area between two of the smaller furrows is elevated, having the appearance of a ridge or carina, which is occasionally prominent. The deep furrows on the right and left sides of the shell appear to be constant features, the others are somewhat variable. Aperture broadly oval, nearly circular; peristome concealed on all the specimens observed, so that its true form cannot be ascertained. All the specimens occurring in the form of casts, the surface markings are obsolete. This species may be distinguished from *Platyceras mitelliforme* by its straighter form, absence of a prominent carina, by its conspicuous plications; from *P.* (*O.*) *striatum* by its smaller size, more frequent plications, and the absence of radiating striæ, the convexity of the anterior side and the concavity of the posterior; from *Platyceras inequale* by its equally developed right and left sides and its conspicuous plications; from *P.* (*O.*) *breve* by its curved, more slender form, and plications; from *Platyceras dorsale* by its smaller size and conspicuous plications; from *P.* (*O.*) *attenuatum* by the straight apex and the strong lateral furrows; from *Platyceras carinatum* by the absence of a prominent carina and by the conspicuous lateral furrows; from *P.* (*O.*) *conicum* by its smaller size and curved form.—Four miles north-west of Warren, Warren county, Pennsylvania, in *Chemung upper beds. VIII g.*





Platyceras ventricosum, Conrad, Annual Report of New York Survey, 1840. Geology of Canada, 1863, page 958, fig. 461. Hall, Pal. N. Y. Vol. 3, 1859, p. 310, figs. 1, 2. *Lower Helderberg formation.* *VI.* — In Pennsylvania, found along the Pike and Monroe county outcrop of the *Oriskany*, especially on Broadhead's Creek (G6, p. 123, 124); also, in Montour county, Cooper township, at Grove Bro.'s tunnel, at Hartzell's quarry, and along Chilisquaque Creek (G7, p. 86, 297, 305, 310); also in Huntingdon Co. at Mapleton (T3, 119), and at Three Springs and Orbisonia (T, 35, and C. E. Hall's MS. report 1875). See Claypole's catalogue (in OOO) Spec. 95–3 (four), 200–4 (two), from Grove Bro.'s quarry, Columbia Co. and 200–4 (two) from Mapleton, Huntingdon Co. *VII.*



Platyceras——? (*Orthonychia*——?) Hall. Geology of the Fourth District of New York, 1843, page 172, fig. 68, 3 [36] 3. *Upper Helderberg formation.* *VIII a.*

Platyceras, of several species, abound in all the *Oriskany* glass-sand quarries at Mapleton, Huntingdon Co., Pa., and along Sand Ridge, east and west from the Juniata river, where the formation stands nearly vertical on the southeast side of the great basin. They are known by the quarrymen as "cows horns." Multitudes of them occur in spots at various places along the outcrop; and the rock is often completely honeycombed with their casts. These abound also in the upper part of the formation where it rises with a moderate dip at the Car works at Huntingdon on the north side of the basin (T3, p. 257, 270, 274). In Bedford county they abound in the *Oriskany sandstone* outcrop on the south side of Bedford Springs, but not in a good state of preservation; also along Wills' creek to the Maryland line, as at Hyndman station, where they crowd the bottom calcareous sandstone bed (142′ below the top of the formation) No. 40 of the section, which makes the topmost stratum of the cherty limestone upper member of the *Lower Helderberg formation* (T2, p. 86, 104, 148). They occur in the corresponding limey sandstone at the end of Royers' Ridge, Orbisonia, Aughwick Valley, Huntingdon Co. See spec. 703–8, of Ashburner & Hall's collections.—*VII.*

Platyceras, of undetermined species, is reported by I. C. White in G 7, page 289, as one of the *Hamilton forms* in bed No. 75 of his Catawissa-Bloomsburg section in Columbia Co., Pa., just underlying the *Genesee shale*, and therefore corresponding to the *Tully limestone* of New York; but without a single one of the *Tully fossils*. It occurs also in the same rock on Little Fishing creek north of Montour ridge (G7, 75).—*VIII f.* Possibly this is the horizon of a *Platyceras* (Specimen 801–16) in Chance's collections on Marshall's creek, Monroe Co., 1½ miles north of Craig's meadow. (OO, p. 237.)

Platyceras, numerous in Randall's section, divisions F, G and H (Report IIII, p. 305). *VIII–IX.*

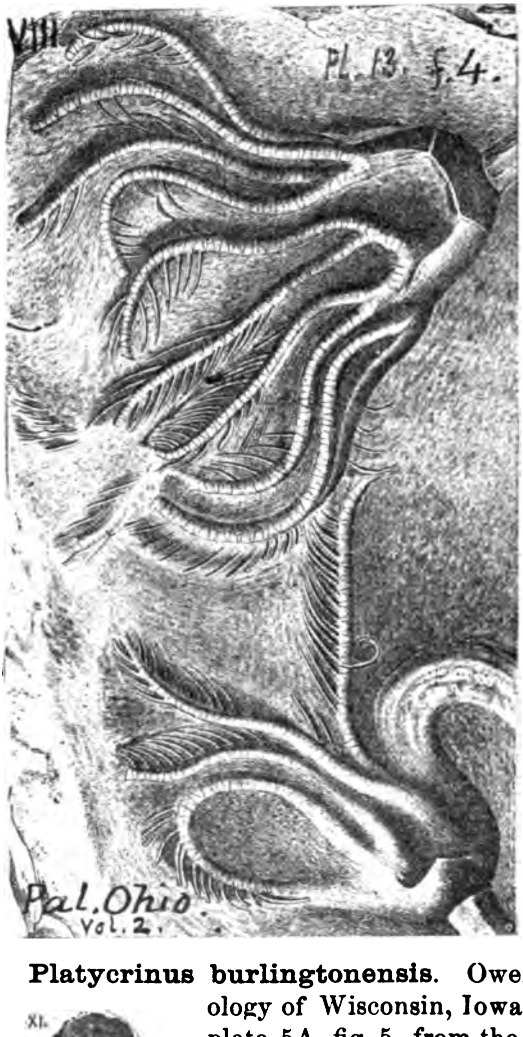
Platyceras, abundant below the *Third Mountain Sand* at two places in Venango Co., Pa., one 3 m. N. 50° W., the other 2½ m. N. W. of Pleasantville; in strata lying, the one 300′, the other 250′ beneath the *Second Mountain sand.* Report I, p. 79. *X.*

Platyceras, in *Third Mountain sand* (IIII p. 273). *X.*

Platyceras, a fine specimen collected by Hatch, near the base of a fine exposure of the *Second Mountain sand* (*Corry sandstone* of I. C. White) in Warren Co., Pa., near the Crawford Co. line (Q4, p. 93.) *X.*

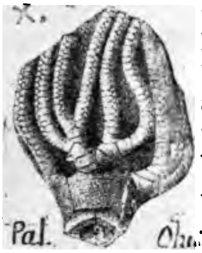
Platyceras appears in the middle 200′ of Randall's section at Warren (*f*), underneath the *First Mountain sand* or *fish* *conglomerate* (*e*). No plants appear in this middle division of the section. (Report I, p. 53.) *X*.

Platycrinus bedfordensis, Hall & Whitf. Pal. Ohio, Vol. 2, 1875, page 161, plate 13, fig. 4, part of a stone surface in which the crinoids are imbedded and partly covered by a pyritiferous shale; body plates apparently smooth; column somewhat five-sided, and decidedly spinode on the edge of the plates; closely resembles *P. lodensis* of the *Waverly*, but is more robust, and its arm-plates extend clear across the arm. Upper part of *Erie shale*, at Bedford, O.—*VIII*.

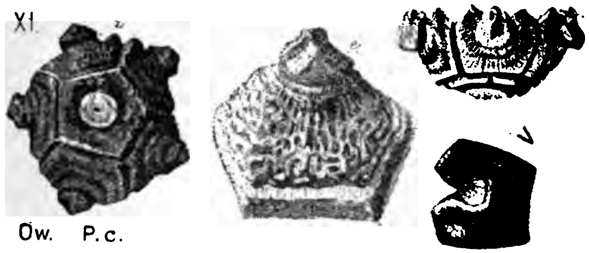

VIII
PL. 13. f. 4.
Pal. Ohio
Vol. 2.

Platycrinus burlingtonensis. Owen & Shumard, Geology of Wisconsin, Iowa & Minnesota, 1852, plate 5A, fig. 5, from the (Subcarboniferous) *Burlington limestone*, *XI*.

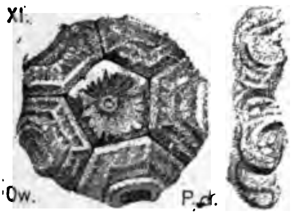
Platycrinus contritus, Hall. Crinoids of the *Waverly sandstone* of Ohio, 1863, Pal. Ohio, Vol. 2, 1875, page 166, plate 11, fig. 4, a specimen showing the peculiar form of the basal plates; the arms, preserved for half their length showing the mode of bifurcation; column unknown; belongs to type of *P. burlingtonensis* and its varieties. *Waverly shales* of Summit Co., O. —*Pocono formation*, *X*.



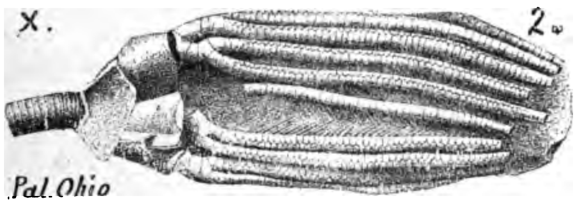
Platycrinus corrugatus. Owen and Shumard, 1852, pl. 5A. f. 2, a, b, c, (d), e, showing corrugated surface of scapular plate; *Burling. lime.* Iowa.—*XI*.



Platycrinus discoideus. Owen & Shumard, Geol. of Wis. etc., plate 5A, fig. 1, a, b, showing the form of the surface to which the arms of this stone lily was jointed into the cup or head. *Burlington limestone*, Iowa.—*XI*.

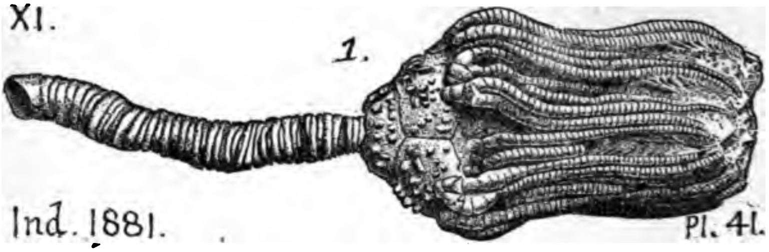


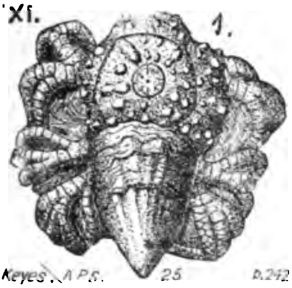
Platycrinus graphicus, Hall ·17th Rt. Crinoids of the Waverly sandstone, Ohio, 1863.—Pal. Ohio Vol. 2, 1875, page 166, plate 11, fig. 2; body plate broken and crushed; showing mode of forking of the arms; surface of plates obscurely marked by radiating lines of nodes; column of alternate thick and thin joints; differs from *P. contritus* in having longer and slenderer arms, and only 4 from each

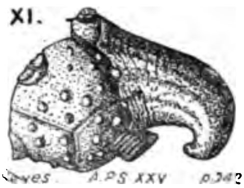


ray; also nodose calyx. From *Waverly shales*, Summit Co., O.—*X*.

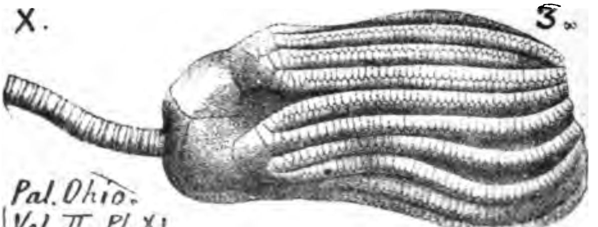
Platycrinus hemisphericus, Meek & Worthen, 1865, Proc. A. N. S. Phila. Collett's Indiana Report of 1881, page 368, plate 41, fig. 1. Keyes. Amer. Philos. Soc. Phila. Vol. 25, No. 128, p. 242, fig. 1, growing on a *Platyceras infundibulum;* fig. 2, growing on *Platyceras equilaterum*. *Subcarboniferous*, *Keokuk limestone*.—*XI*.


XI.
1.
Ind. 1881.
Pl. 41.



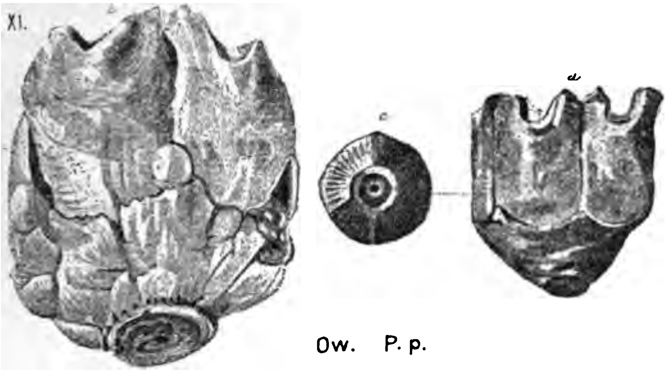


Platycrinus lodensis, H. & W. Pal. Ohio, Vol. 2, 1875, p. 168, pl. 11, fig. 3, with strong arm bases; basal plates slightly restored by the draftsman; apparently smooth, or delicately granulose. Belongs to the group *P. wortheni*, *P. shumardiana*. etc., but is specifically different in absence of cup ornamentation, greater height, and arm arangement. *Cuyahoga limeshales* (*Waverly*), Medina Co. O.—*Pocono formation*, *X*.

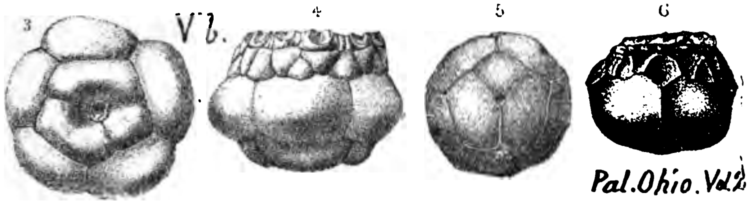

X.
3.
Pal. Ohio.
Vol. II. Pl. XI.

Platycrinus planus. Owen & Shumard, Geol. Wisconsin, etc., 1852, pl. 5A, fig. 4 *a*, specimen of medium size; *b*, large specimen from *Burlington limestone*, Iowa; *c* detached plate at the base, where the cup joins the stem. *XI*. (*Fig. on 689.*)

(*Figure of Platycrinus planus.*)

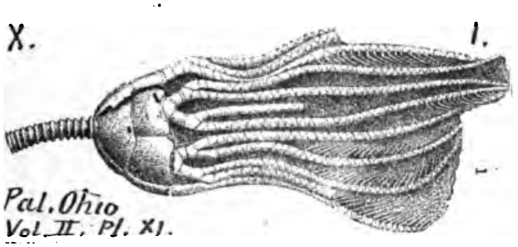


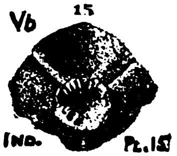
Platycrinus præmaturus, Hall & Whitfield, in Pal. Ohio,



Vol. 2, 1875, p 124, pl. 6, figs. 3, 4, gutta-percha casts; 5, 6, interval cast of calyx, basal and lateral views, basal plate surface tuberculose; general surface smooth. NOTE. Gutta-percha casts of hollows left by dissolution of the crinoid are very different from the natural casts of the interior of the body as numerously found, viz: flattened or depressed spheres, preserving only the suture lines but showing none of the external features except the shape of the plates. *Niagara. V b.*

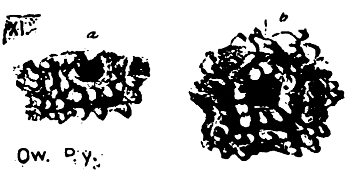
Platycrinus richfieldensis, H. & Whit. Pal. Ohio, Vol. 2, 1875, p.167, pl.11, f. 1, very slightly restored in drawing the region of the radial plates; cup-plates smooth even under a moderate lens; small column of alternate large and small joints; aspect of *Dichocrinus*, but all first radial plates carry arms. *Waverly. X.*





Platycrinus siluricus, Hall, Trans. Alb. Inst. X, abstract p. 9, 1879; Collett's Indiana report of 1881, p. 256, plate 15, fig. 15, base of calyx, showing its large strong plates, which are nearly flat in the middle, and abruptly depressed into the sutures; surface granulose, granules long, winding and flowing together. Waldron, O. *Niagara*. *V. b.*

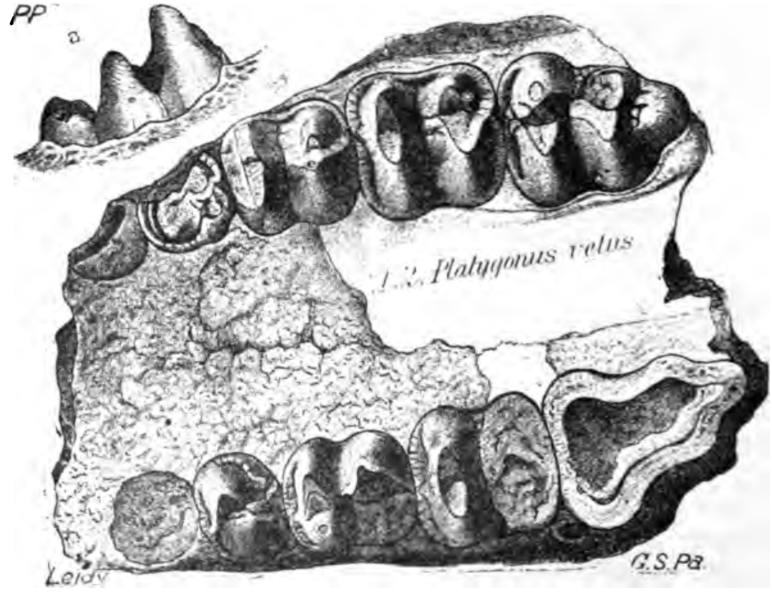
Platycrinus yandelli, Owen & Shumard, Geol. Wisconsin, etc., 1852, plate 5A, fig. 6, from *Burlington limestone*, Iowa; subcarboniferous.—*XI.*



Platycrinus——? Recognized by J. Hall in specimen 807–38.

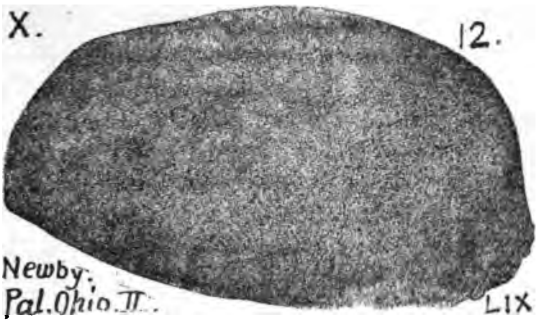
Platygonus compressus, J. LeConte. Collett's Indiana Report of 1884, p. 20, pl. 1. An extinct peccary from the saltpetre cave in Kentucky.—*Human era?*

Platygonus vetus, Leidy, Proc. Acad. Nat. Sc. Phila. 1883,

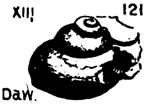


page 301; An. Rt. Geol. Sur. Pa., 1887. Fragments of the jaws, with teeth, of a large extinct Peccary, found in a crevice in a limestone quarry in Mifflin Co., Pa., and given to the Academy by Mr. John Swartzer.—*Human era?*

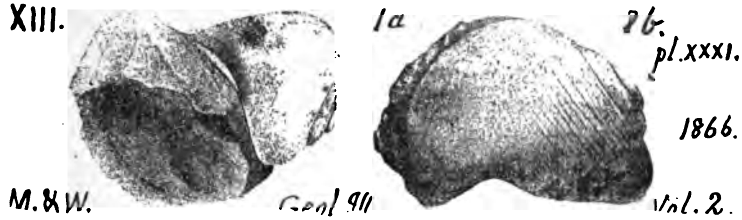
Platyodus lineatus, Newberry, Pal. Ohio, Vol. 2, 1875, page 58, plate 59, fig. 12, *natural size,* crown surface of a solitary tooth of this species of subcarboniferous fish of great size, found by D. Newberry, on Dunn's farm 8 miles S. of Liberty, Casey Co., Ky., somewhat worn by use, croded by exposure, gently arched in both directions, crossed by wavy lines or rows of points, covering the whole surface; differing thus from all other known fish-teeth.— *Waverly, X.*



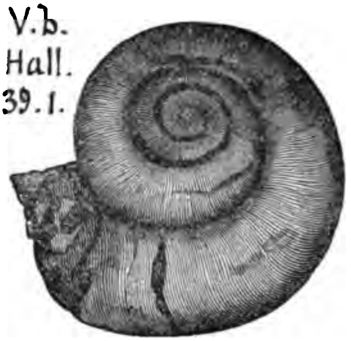
Platyschisma dubia, Dawson, Acadian Geology, page 309, fig. 121, a very small and rare whorled shell, only one specimen being found in *Lower carboniferous limestone* of Windsor, N. S.—*XI?*



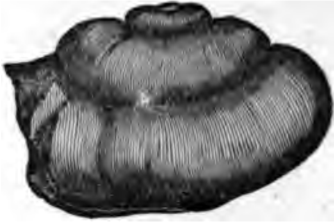
Platystoma grayvillense, name proposed by Worthen in Bull. No. 1, Illinois State Museum of Nat. Hist. 1882, for *Platystoma tumida.* Meek & Worthen, Proc. Acad. Nat. Sci. Phil. 1860, preoccupied by Phillips; and for *Pleurotomaria tumida,* M. & W. Geol. Ill. Vol. 2, 1866, p. 361, pl. 31, figs. 1*a*, 1*b*. See *Pleurotomaria grayvillensis, below.*—*Plat. tumida* is mentioned in J. J. Stevenson's list of forms found at Morgantown, W., Va. in the *Decker's Creek Shale* beneath the Mahoning sandstone (L, p. 37).—*Coal Measures. XIII.*



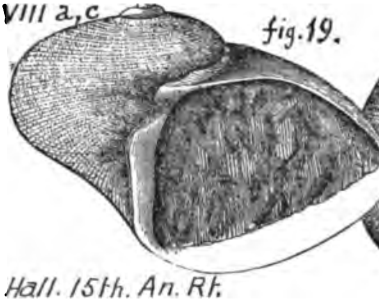
V.b. Hall. 39.1.

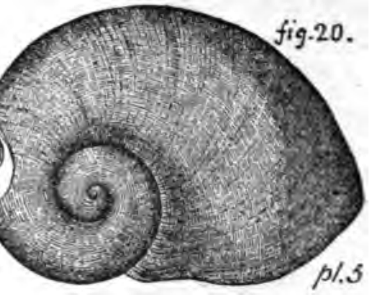


V.b. H.39.1b.



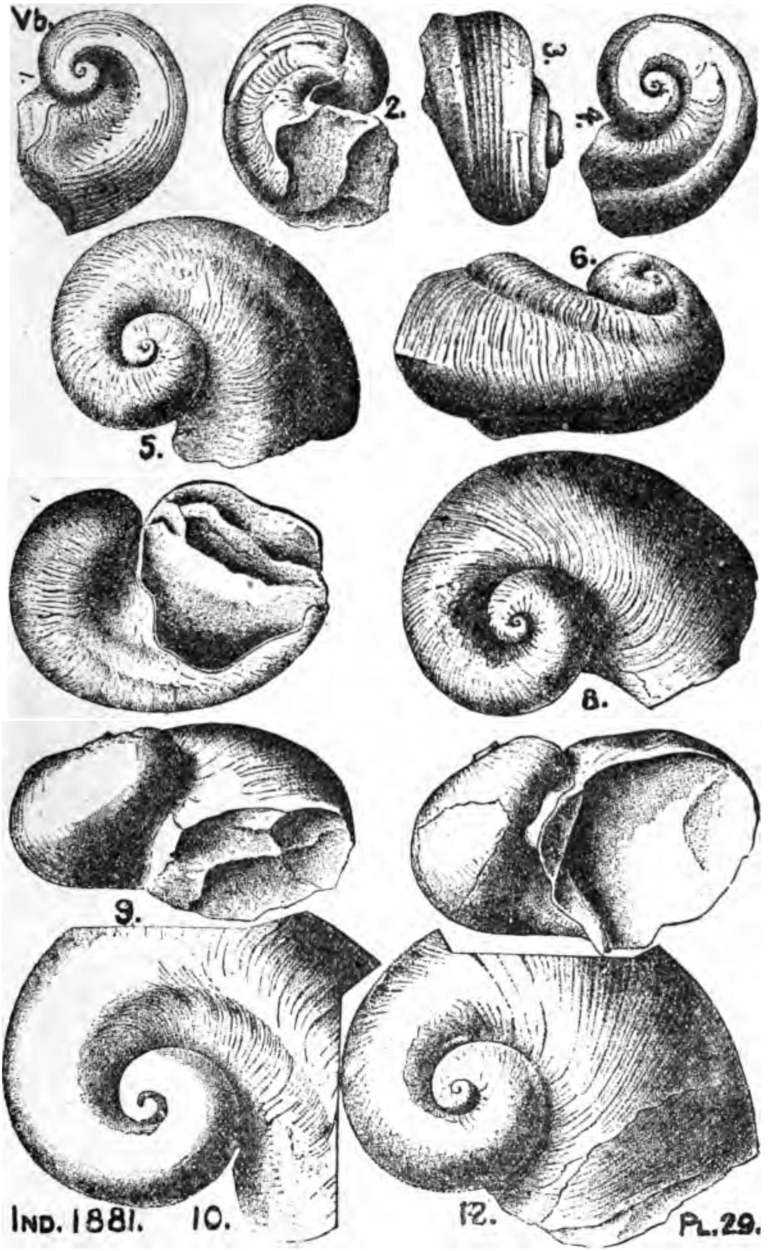
Platystoma hemisphericum, (*Euomphalus hemisphericus*), Hall, Geology of the Fourth District, N. Y. 1843, p. 109, figs. 39, 1, 1*b*, *Niagara limestone*, *Vb*.—NOTE. The spelling *Platyostoma* so frequently employed, if in accordance with the old rule that compounds should be made with the Greek genitive and not with the nominative, is nevertheless wrong, as it should be *Plateostoma*. But the accepted spelling *Platyceras*, *Platycrinus*, etc. justifies the use of *Platystoma*, "wide mouth."

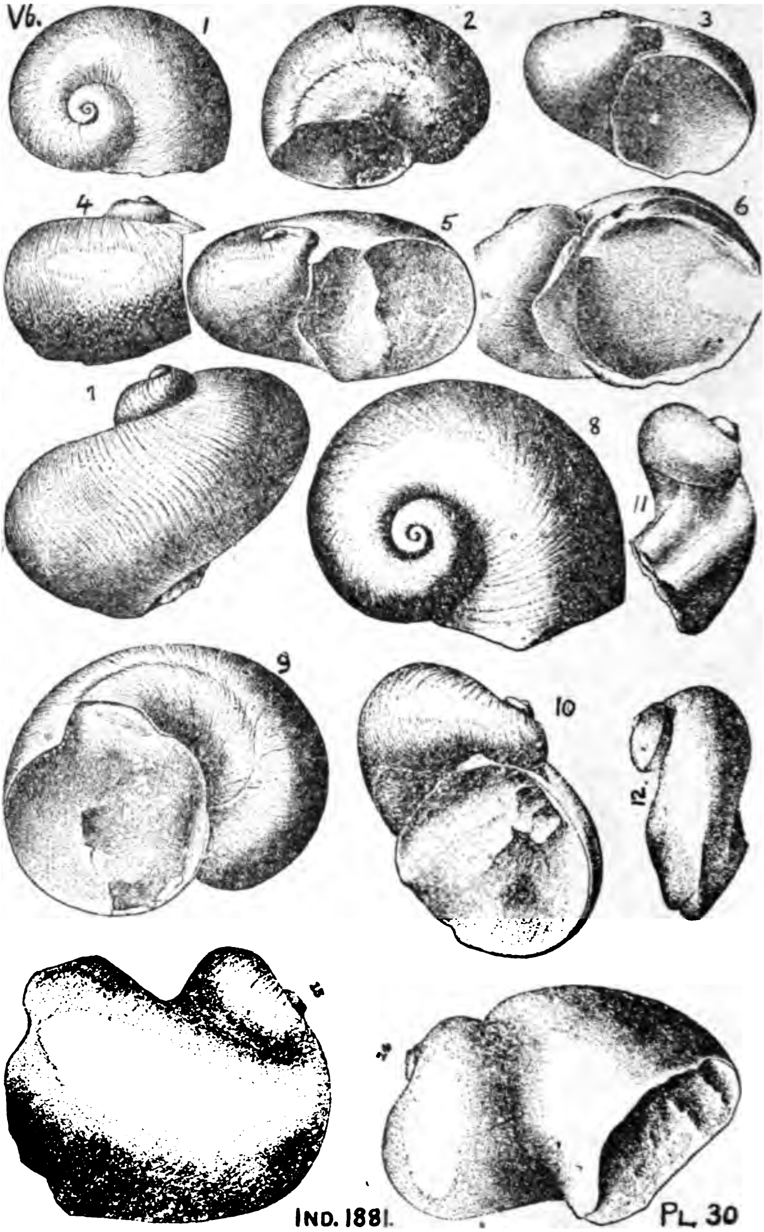

VIII a, c
fig. 19.
Hall. 15th. An. Rt.



Platystoma lineatum, Conrad, (*Platystoma lineata*? Conrad. Jour. Acad. N. S. Phila. Vol. 8, p. 275, pl. 17, f. 7.) Hall's 15th Report, 1862, p. 40, pl. 5, figs. 19, 20, drawn from one of two hundred individuals found in the *Hamilton*. Well preserved surfaces are beautifully cancellated, and some remains of these markings may be seen even in worn and partially peeled specimens. Looks something like *P. turbinata* (*VII b*, *VIII a*) but the spire is never so depressed, etc. A cast from Batavia is 3 inches long, with a vertical diameter of aperture only 1½ inches. Found the whole length of New York in the *Upper Helderburg*; and in the *Hamilton* of Western New York.—*VII a*, *VIII c*.

Platystoma niagarense, Hall, Pal. N. Y. Vol. 2, 1852, figs.




V6.
1
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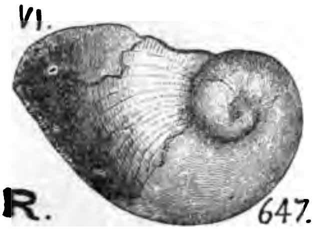
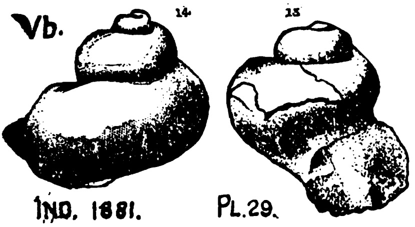
IND. 1881.
PL. 30

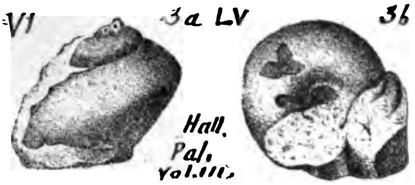
from Collett's Indiana, 1881; p. 318, pl. 29, figs. 1–12 (omitting fig. 11). Also plate 30, figs. 1–15.—In Pennsylvania collected by C. E. Hall, 1875, in Furguson and Aughwick valleys, Huntingdon Co., in *Clinton shales* (133′ thick) overlying the *Clinton fossil ore bed* at Orbisonia, and McKeesburg (T3, p. 141). See Cat. OO, p. 233, specimens 505–14, 505–25, at McKee's ore bank. NOTE. The *Platyostoma*——? of H. D. Rogers, Geology of Pa. 1858, page 825, fig. 647, from the Aughwick valley, is probably the same; but is assigned by him to the *Lower Helderberg limestone* as he did not recognize the existence of the *Niagara formation* in Middle Pennsylvania.—*Vb; VI?*



Platystoma plebium, Hall. From Collett's Indiana Report of 1881, page 319, plate 29, fig. 14, 15, opposite sides of a specimen, showing height of spire and form of volution and aperture.—*Niagara, Vb.*

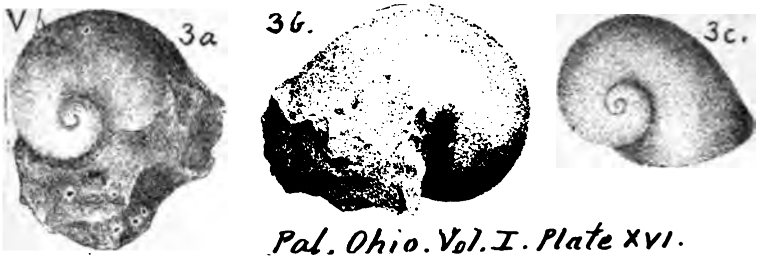


Platystoma ? subangulatum. Hall, Pal. N. Y. Vol. 3, 1859, page 301, plate 55, figs. 3 *a*, side, 3 *b*, base, of specimen without shell, therefore genus doubtful; from the red compact layers of the *Lower Helderberg*, in Albany Co., N. Y., *VI.*—Spec. 792–7, Orbisonia, Pa., from *Oriskany lime sand.*, resembles closely figure in Hall.—*VII.*

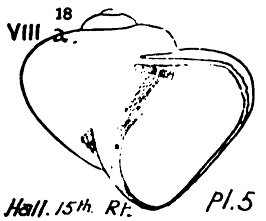


Platystoma (*niagarensis*, Var.) **trigonostoma,** Meek. Proc. Acad. Nat. Sci. Phila. 1871, *Niagara.*—Pal. Ohio, Vol. 1, 1873, page 185, plate 16, figs. 3, *a*, *b*, upper and under side of cast; *c*, upper side of another specimen. Mr. Meek makes this a variety of Hall's *P. niagarensis.* Pal. N. Y. II, pl. 60; Hall & Whitfield, List, Louisville, 1872. See woodcut on Pal. Ohio, I, p. 186. *Niagara*, Yellow Springs, O.—*Vb.*

(*Figure of Platystoma trigonostoma.*)



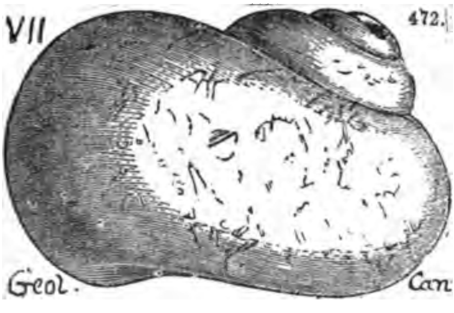
Pal. Ohio. Vol. I. Plate XVI.



Platystoma tumidum. See **P. greyvillense.** *XIII.*

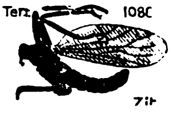
Platystoma turbinatum, Hall. 14th An. R. N. Y. 1861, page 106. Figure from 15th An. Rt. 1862, plate 5, fig. 18. *Upper Helderberg formation. VIII a.*

Platystoma unisulcatum, (*Pleurotomaria unisulcata,* Conrad, 1842,) Hall, Pal. Vol. 5. *VIII a.*



Platystoma ventricosum, Conrad. Journal of Academy of Nat. Sciences, Phila. Vol. 8, 1842, *Lower Helderberg.* Figure borrowed from Geology of Canada, 1863, page 962, fig. 472, assigned to the *Oriskany formation.* — In Pennsylvania collected by C. E. Hall from Royers' ridge near Orbisonia, Huntingdon, Co. Report OOO, p. 209, spec. 703–12. Also, by White, at Mapleton in the sand quarries (T3, p. 119). Also, in Bedford Co. they crowd a layer of sandstone, 142′ below the top of the *Oriskany formation,* at Hyndman on Will's creek, and are abundant at the south side of Bedford Springs (T2, p. 86, 104, 148).— *VI; VII.*

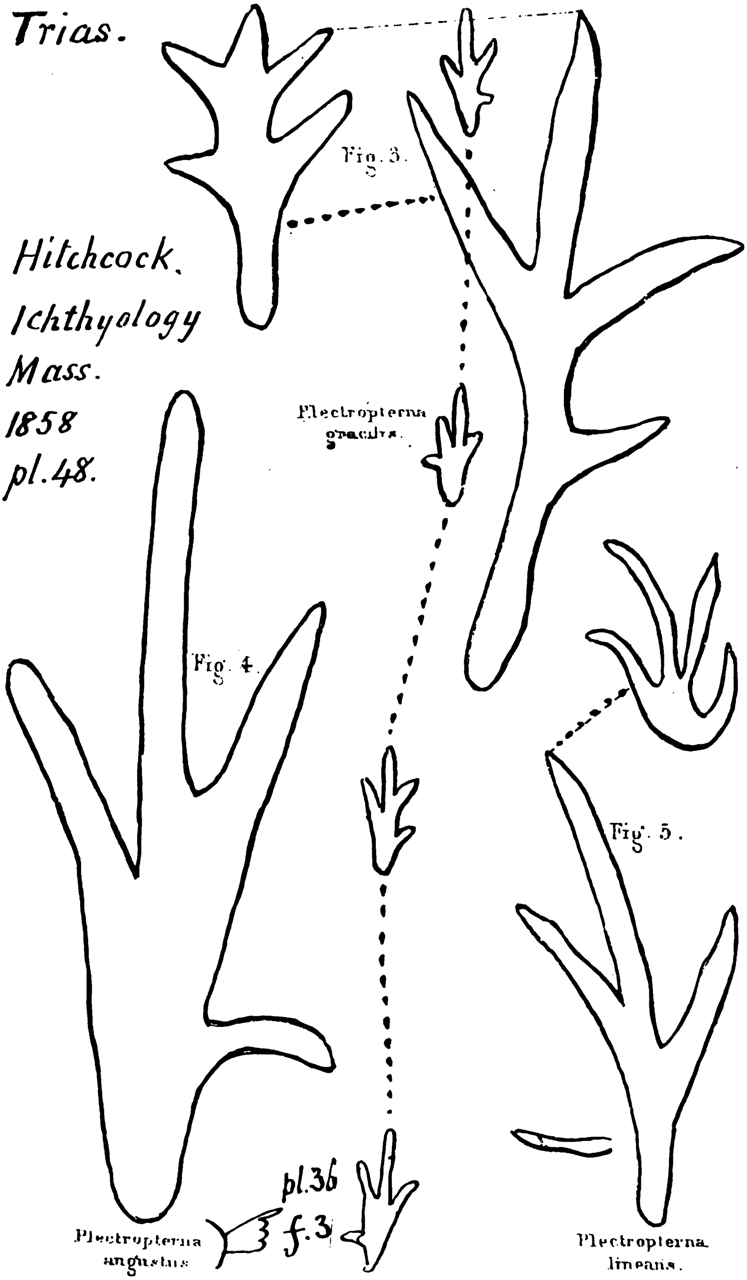
Plecia similkameena, Scudder. An insect found in the *Miocene* (?) *tertiary beds* of British Columbia. Fig. 1086 (½ size) in Zittel's Handbuch—*Miocene.*



Plectropterna angusta, Hitchcock, Icht. Mass. page 110,

Trias.

Hitchcock.
Ichthyology
Mass.
1858
pl.48.



182, plate 48, fig. 4, hind foot; 4.2 inches long; length of stride 12 inches; animal walking nearly on a straight line (plate 36, fig. 3); fore-foot not discovered, and the animal may have been a bird in spite of the resemblance of its track to those assigned to *Plectropterna;* but the long heel and spur at right angles, are strictly lizard-like (lacertilian) features. Connecticut river red sandstone. *Trias.—For figure see p. 697.*

Plectropterna gracilis, Hitchcock, Ichthy. Mass., 1858, p. 109, pl. 18, fig. 3, outline of fore and hind foot tracks, more slender and smaller than *P. minitans;* pl. 48, fig. 2, an indistinct row of them; only certainly found at Gill, Mass. Supplement Ichthyology, Mass., 1865, page 24, plate 17, photograph figure 1, a fine row of foot prints on a slab of Connecticut river red shale, in Amherst museum. *Trias.—For figure see page 697.*

Plectropterna lineans, Hitchcock. Ich. Mass., p. 110, pl. 48, fig. 5, fore and hind foot prints of this lizard. *See page* ———. Tracks found on the Conn. river red shale, Wethersfield Cove, Mass., and on Field's farm; shown on pl. 18, fig. 5 (omitted).—*Trias.—See page 697.*

Plectropterna minitans, Hitch. Ich. Mass. p. 108, pl. 48, fig. 2 (omitted), toes narrow and pointed, length of foot 9 inches, of step 16 inches; heel increasing in width backward and rounded; width of trackway 9 inches, like a lizard's; fore foot not found but undoubtedly five toed, like *P. gracilis*. Abundant at the Wethersfield Cove; also found at Turner's Falls, Mass. *Trias.*

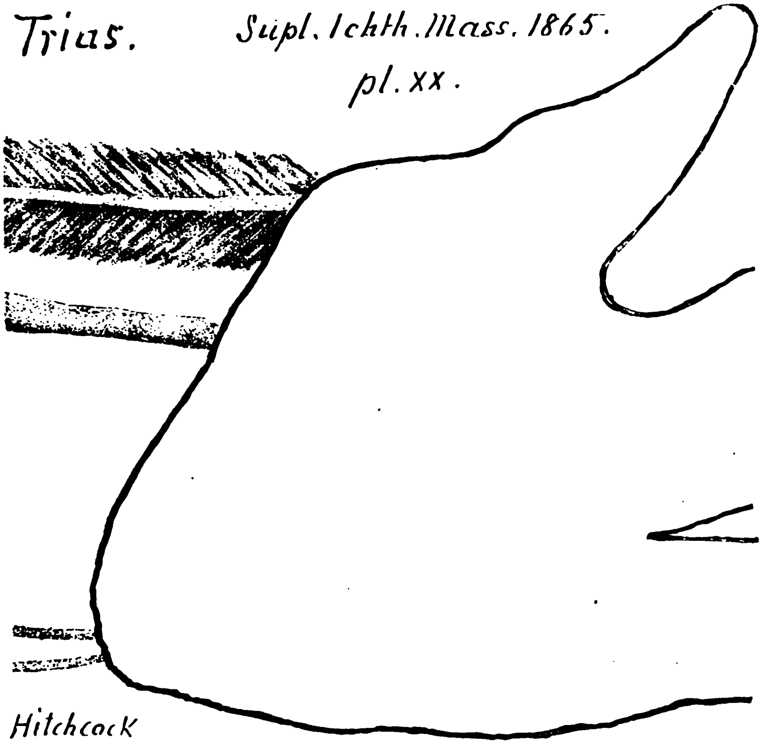
Plectrostylus, a cast of **Macrocheilus paludinæformis** ? *XIII.*

Plectrodus mirabilis. See for figure **Onchus tenuistriatus.**

Plesiornis giganteus, C. H. Hitchcock, Proc. B. S. N. H. Vol. 24, 1888, Dec. 19, page 126. *Trias.*

Plesiornis mirabilis, Hitchcock, Supplement to Ich. Mass., 1865, page 35, plate 20 (natural size), a portion of which alone is shown here, viz, a part of one fore foot print, and a part of

Trias. Supl. Ichth. Mass. 1865.
pl. XX.



Hitchcock

he feather-like trail which accompanies the series of footprints, six in number, on a slab of Connecticut river red sandstone, in the Amherst museum, three feet long. Length of hind foot 6 in.; of fore foot 3½ in.; step of hind feet 12½ in.; of fore feet 12 to 14 inches; toes clawed, but no joints; hind and fore feet sometimes in contact, sometimes 3 inches apart and nearly abreast of each other. Distinct grooves follow the trail, and to the left of them several groups of round holes as if made by the blunt ends of a bundle of sticks dragged along, lifted up and then implanted. On the left hand groove, for six inches of it, its sides are remarkably *feathered.* Had the beast a feathered tail? The tail had several ends and could be used to stand on. The animal was evidently a quadruped, and seems to prophesy the appearance of the bird-lizards of a later age.—*Trias.*

Plethomytilus arenaceus, Hall. (*Mytilarea arenacea.*) Pal. N. Y. Vol. 5, pt. 1. *Schoharie, VII b.*

Plethomytilus knappi, Hall, Vol. 5, i. *VIII c.*

Plethomytilns mytelimeris. (*Inoceramus.* Con.) *VI.*

Pleuracanthus arcuatus, Newberry, Proc. Acad. Nat. Sci. Phil. Vol. 8. *Coal measures.*—Now **Orthacanthus arcuatus**, Newberry, Pal. Ohio, Vol. 1, page 332, plate 40, fig. 4, 4 *a*, cross section. Not uncommon in the *Cannel coal* at Linton, O., bony spines, with traces of a medullary cavity, two-thirds their length, but much smaller than the specimen described by Agassiz, Poiss. Foss. III, pl. 45, figs. 8, 9, as *O. cylindricus*, which was probably once curved like these, but straightened by vertical pressure as some of the Ohio specimens are. The toothing of the hind face of these spines is singularly regular and beautiful; the spines being coated with pyrites look like metal stilletto blades. They probably belong to the fish which left so many *Diplodus* teeth in the same coal mud. See also what Newberry says on page 334.—Smaller, similar, but straight spines are found in the same deposit and named by Newberry **Orthacanthus gracilis.** Pal. Ohio, Vol. 2, page 56, plate 49, fig. 7.—*XIII.*

This figure will be found on page 506.

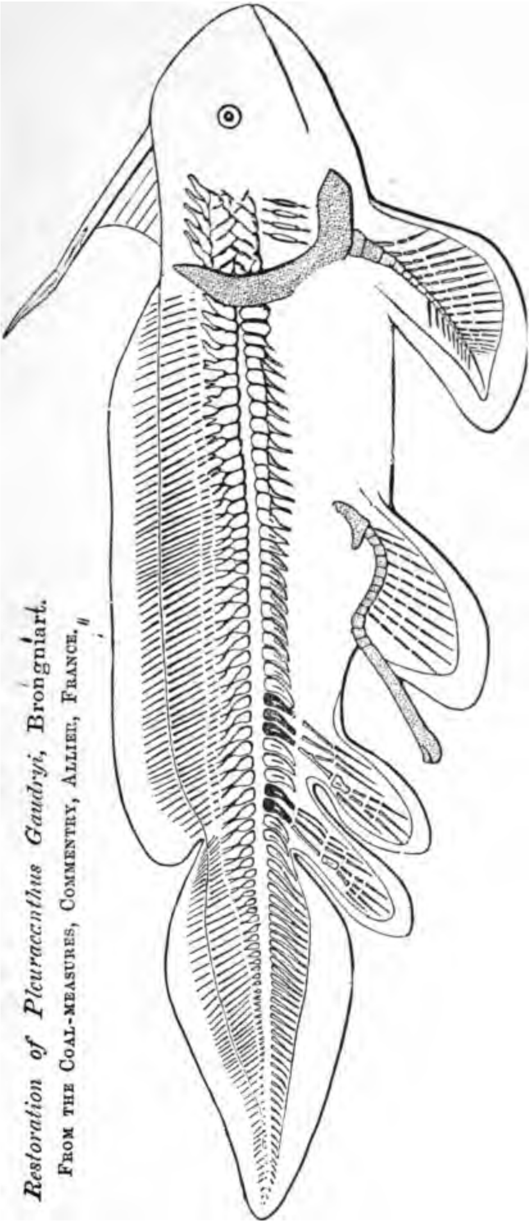
Figure on page 506 above.

NOTE.—The genus was founded by Agassiz in 1843, Poiss. Foss. Vol. 3, p. 66, upon a spine supposed to belong to the order *Raiina*, serrated on one edge, curved at the base, and furrowed at the lower side. The species named in this genus from America are too poorly defined to warrant recognition. Type, *P. lævissimus.* (S. A. Miller, in his North American Geology and Palæontology, 1889.) He further quotes:—

Pleuracanthus biserialis, Newberry, 1857, Proc. Acad. Nat. Sci., Phila., Vol. VIII, p. 100. *Coal measures. XIII.*

Pleuracanthus dilatatus, Newberry, 1867, Proc. Acad. Nat. Sci., Phila., Vol. VIII, p. 100. *Coal measures. XIII.*

Pleuracanthus gaudryi, Brongniart. A restoration of the

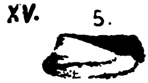


Restoration of Pleuracanthus Gaudryi, Brongniart.

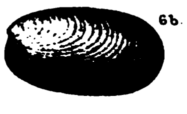
FROM THE COAL-MEASURES, COMMENTRY, ALLIER, FRANCE.

Coal age fish with a spine in the back of his head, from a comparison of 23 examples recently found in France, one of them a complete trunk. Length of young and old from 1½ to 3½ feet; skeleton calcified; no shagreen; each pelvis-fin provided with a robust clasper; barbed spine projecting from the back of the head holds up a small head-fin; two anal fins, one behind the other, each built like true legs, or paddle! Nothing in nature as yet known will compare with this wonderful structure. See C. Brongniart's description, April, 1888, Paris Mus. Nat. Hist., and Dr. Woodward's figure in Lond. Geol. Mag. Sep. 1888, p. 422.

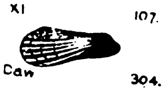
Pleurophorus ? angulatus, Meek and Worthen, Proc. Acad. Nat. Sci. Phil., 1865; Geo. Sur. Ill., Vol. 6, 1875, page 529, plate 33, fig. 5, New Harmony, Ind. *Upper Coal measures.* *XV.*



Pleurophorus oblongus ? Meek, Pal. E. Neb. 1872. M. & W., Geo. Sur. Ill., Vol. 5, 1873, page 589, plate 26, figs. 6 *a*, *b*, Springfield, Ill. *Upper Coal measures.* *XV.*



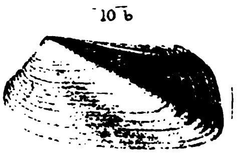
Pleurophorus quadricostatus, Dawson, Acad. Geology, 1868, page 304, fig. 107, a curiously shaped small shell of the *Carboniferous limestone* of Nova Scotia.—*XI.*



Pleurophorus subcostatus. Meek and Worthen, Proc. Acad. Nat. Sci. Phil., 1865. M. & W., Geo. Sur. Ill., Vol. 2, 1873, page 347, plate 27, figs. 2, side view of internal cast, showing muscular and pallial impressions, and of long hind hinge-tooth; 2 *a*, back of same. Apparently related to the English *P. costatus* of Brown (sp.) among King's *Permian fossils* (plate 15), but shows differences. Perhaps identical with *P. subcuneatus*, Meek & Hayden, *Permian*, (*Permo-Carboniferous*) beds of Kansas, but grew much larger and has a distinct sinuous base. Gallatin Co., Ill. *Upper Coal measures.* *XV.*

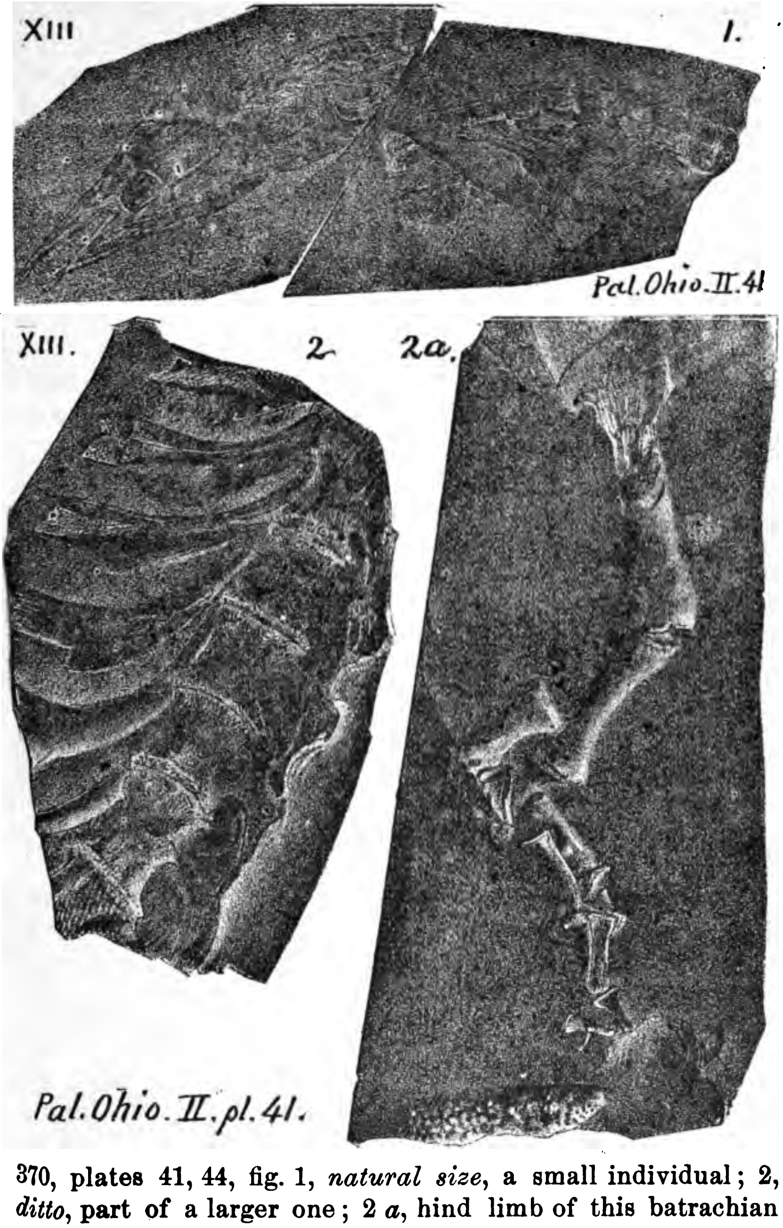
Pleurophorus tropidophorus, Meek, Pal. Ohio, Vol. 2, 1875, page 338, plate 19, fig. 10 *a*, cast of outside of right valve; *b*, cast of inside of left valve, with impressions of side teeth; strikingly like *Cypricardia striatolamellosa*, De Koninck, An. Foss. Carbon. Belgium, but without its deep lunule, etc. *XIII.*

XIII
10a
Pal. Ohio. Vol II. XIX



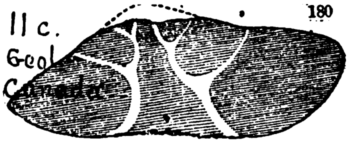
Pleurophorus ——— ? In the *Barren measures*, 250′ beneath the Pittsburgh coal bed. K3, p. 310, L, p. 36.—*XIV.*

Pleuroptyx clavatus, Cope, Pal. Ohio, Vol. 2, 1875, page 370, plates 41, 44, fig. 1, *natural size*, a small individual; 2, *ditto*, part of a larger one; 2 *a*, hind limb of this batrachian reptile of the Ohio *Coal measures*.—*XIII.*

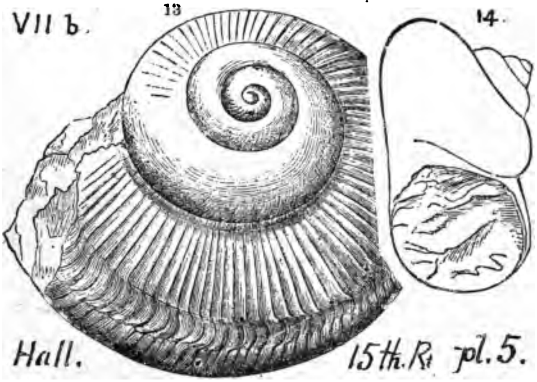


Pleurorhynchus. See **Conocardium.** *VIII a.*

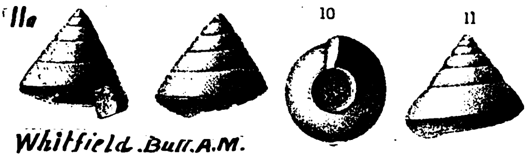
Pleurotomaria americana, Billings. Geology of Canada, 1863, page 184, fig. 180, section through the middle of the whorls. *Trenton limestone. II c.*



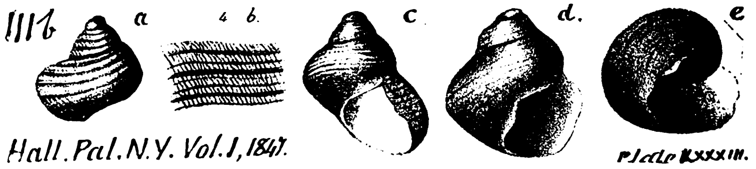
leurotomaria arata, Hall. 15th Annual Report, 1862, p. 42, pl. 5, figs. 13, 14. Casts of the interior abundant in the *Scoharie grit*, eastern New York, but specimens retaining the shell rare; stronger markings often preserved on the casts; shell apparently distinctly umbilicate. *VII b.* — In Pennsylvania, found in Pike Co., at Dingman's Falls. Specimen 808–14 (one whorl only) with *Pholadella parallela.—Hamilton? VIII c?*



leurotomaria beekmanensis, Whitfield. Amer. Museum of Nat. His. N. Y. Bull., Vol. 2, No. 2, page 53, plate 8, figs. 8, 9, 10, three nearly entire individuals; fig. 11, side view of a broader specimen. Of the type of *P. etna*, and *P. ramsayi*, Bill. From compact limestone at Beekmantown, N. Y., in *Calciferous formation. II a.*

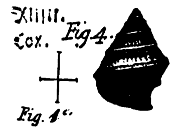


Pleurotomaria bilix (now **Cyclonema bilix**) Conr. Jour.

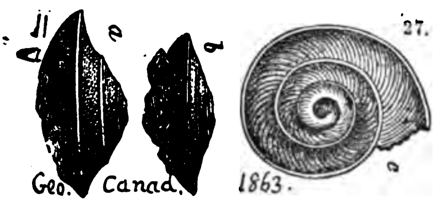


Acad. Nat. Sci. Phila. Vol. 8, *Trenton* and *Hudson river formations.* Hall., Pal. N. Y. Vol. 1, 1847, page 305, plate 83, fig. 4 *a*, small, showing back of spire and expansion of last whorl; *b*, *enlarged* surface to show alternating larger and smaller carinæ (keels) crossed by the oblique fine striæ; *c*, larger specimen; *d*, another with aperture entire on the outer margin; *e*, base. Resembles *P. bicarinata* of the *Trenton formation*, but differs essentially in having the whorls angulated only on the center. It is also always shorter than the *Trenton P. uniungulata.* It is found in the higher beds of the *Hudson river shale* at Turin and Rome, N. Y.—Reported found in Pennsylvania by H. D. Rogers, Geol. Pa. 1858.—*III b.*

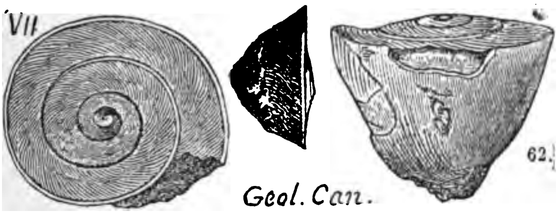
Pleurotomaria bonharborensis, Cox, Geological Survey of Kentucky, Vol. 3, page 567, plate 8, fig. 4, *enlarged; 4 a, natural size.* Abundant in the roof shales of the Bonharbor coal No. 11, Davies Co., Ky. *Upper coal measures X V.*



Pleurotomaria calcifera, Billings. Geology of Canada, 1863, page 117, fig. 27 *a*, the usual form of the shell; 27 *b*, a variety with the spiral depressed; 27 *c*, view of the spiral. *Calciferous sandstone. II a.*



Pleurotomaria calyx, Billings. Geology of Canada, 1863, page 132, fig. 62 *a*, view of the spiral; 62 *b*, side view; *c*, smaller specimen. *Chazy limestone. II b.*



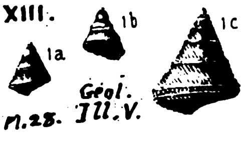
Pleurotomaria capillaria, Conrad, Jour. Acad. Nat. Sc. Phila. 1842, Vol. 8, p. 271, pl. 16, fig. 11.—Hall, Pal. N. Y. Vol. 5, part 2, pl. 70, figs. 18 to 21; 15th Annual Report, New York, p. 45, pl. 5, fig. 2; from the *Hamilton* coarse shales. (A similar but slenderer and more closely striated variety is

found in the *Upper Helderberg limestone VIIIa*). *VIIIc.*—In Pennsylvania, found by Claypole, see preface to F. 2, in *Hamilton*, *VIIIc*—Cat. OOO, p. 239, Spec. 872–40 from Nichols, Tioga Co., N. Y. *Chemung*, closely resembles one of Hall's figs. See Claypole's catalogue (in OOO) specimens 2-8, from Comp's mill, near N. Bloom., Perry Co.; 5-3,-13,-19 (three), -42 from Barnett's mill, Perry Co. 518-29, from Dorran's narrows, Centretown, Perry Co.; 196 17, from Rough and Ready, Huntingdon Co. (See T3, p. 109) all in *Hamilton upper shale*. At Cove Station, in *Hamilton bottom beds* (T3, 111).—*VIIIc.*

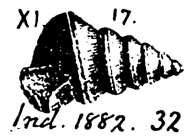
Pleurotomaria carbonaria, Norwood and Pratten, J. A. Nat. Sci. [2] Vol. 3, 1854. *Coal measures.*—In Pennsylvania reported by White in the *Ferriferous limestone* and undershales (Allegheny series), in N. Sewickley township Beaver Co. (Q, 62, 205); in Lawrence Co. (Q2, 47, 106); in Mercer Co. (Q3, 25). Also by Stevenson, in the *Decker's creek shale*, under the Mahoning sandstone, at Morgantown, W. Va. (See L, 37.)—Also by W. S. Platt, in the *Black fossiliferous limestone* of the Barren measures, Indiana Co. (H4, 78.) See also K3, 310.—*XIII*, *XIV.*—*See Appendix.*

Pleurotomaria concava. See **Eotrochus concavus.**—*XI.*

Pleurotomaria coniformis. (*P. conoides*, Meek & Worthen, Proc. Acad. Nat. Sci. Phila. 1866); M. & W., Geo. Sur. Ill., Vol. 5, 1873, p. 603, pl. 28, figs. 1*a*, *nat. size*, side view; *b*, opposite side and aperture; *c*, *enlarged* to show the surface markings and the spiral band. Differs from the rest of the trochiform group (*P. riddellii*, *turbiniformis*, *missouriensis* and *obtusispira* by its smallness, and from all but the last in wanting revolving strip on upper side of whorls. Same of *Trochus coniformis*, DeKoninck. From the *Lower coal measures* of Illinois.—Recognized in the Pennsylvania bituminous coal measures by J. J. Stevenson. (K3, p. 310).—*XIII.*



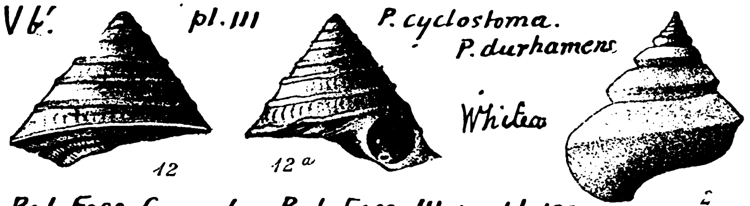
Pleurotomaria (*Murchisonia ?*) **conula**, Hall, Trans. Alb. Inst. Vol. 4, 1856.—Whitfield, Bull. 3, Amer. Mus. N. H., N. Y., 1882, pl. 9, fig. 18. Collett's Indiana Rt. 1882, p. 258, pl. 32, fig. 17), mouth and slit shown in the most perfect specimen, *enlarged four times;* quite distinct from all other species by its



gradual spire. centrally angular whorls, and long regular cone form.—Spergen Hill, etc., end.—Like *Murchisonia insculpta*, *Subcarboniferous.—XI.*

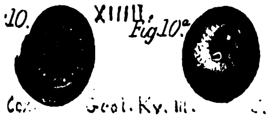
Pleurotomaria coronata, near **P. wortheni.**—*XI.*

Pleurotomaria cyclostoma, Whiteaves. Pal. Foss. Can-



Pal. Foss. Canada, Pal. Foss. III, part I, 1884.

ada, 111, i, 1884, page 23, plate 3, fig. 12, side view of a specimen from Durham, Canada West; 12 *a*, another showing mouth; crowded transverse striæ; shell extremely thickened at the periphery of the last volute, so as to make an exactly circular mouth; a curious feature seen also in *Pterocheilus primus*, Moore, from English *Lias*. Differs from *P. bispiralis*, Hall, in more obliquely flattened spire, etc.—*Guelph formation. Vb'.*

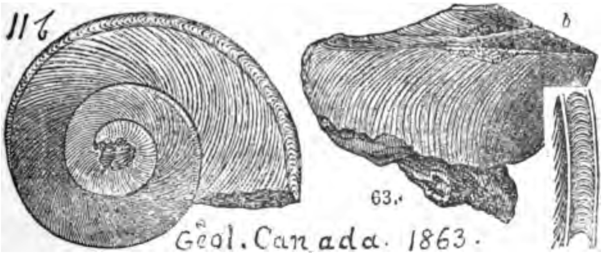

10.
XIIII.
Fig 10a.
Cox. Geol. Ky. III.

Pleurotomaria depressa, Cox. (The name *depressa* was used twice before Cox described this species, which must therefore be renamed). Geol. Sur. Ky., Vol. 3, 1857, page 569, plate 8, fig. 10, *enlarged;* 10 *a*, *natural size.* Common in the rock shale of No. 11 coal, at Bonharbour and Airdrie, Kentucky. *Upper coal measures. XV.—See P. modesta below.*

P. disjuncta, Hall, Pal. N. Y. Vol. 5, ii.—*VIII c.*

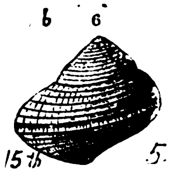
P. dispersa, Dawson, Acad. Geol. 310.—*XIII?*

Pleurotomaria docens, Billings. Geology of Canada, 1863



page 132, fig. 63 *a*, view of the spiral; 63 *b*, side view; 63 *c*, part of the band *magnified. Chazy limestone. II b.*

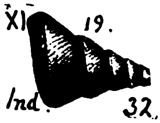
Pleurotomaria doris, Hall. 15th Annual Report, N. Y., 1862, page 43, plate 5, fig. 6. Less round than *P. lucina;* spire higher; revolving striæ stronger. *Schoharie grit*, and *Corniferous limestone*. *VII b*, *VIII a*.



NOTE. S. A. Miller makes this a synonym of *Cyclonema doris*.

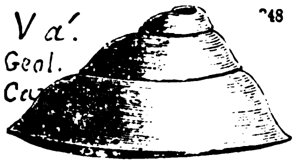
Pleurotomaria durhamensis, Whiteaves. (For figure see under *P. cyclostoma*). Pal. Foss. Canada, III, i, 1884, page 24, plate 4, fig. 2, an unusually perfect cast of the interior; surface markings unknown; outline not unlike *Straparollina pelagica*, Bill. from the *Quebec group* (*Lower Silurian?*) of Newfoundland; but this has 8, and that only 5 or 6 whorls, and the lower ones not distinctly angulated. Unique specimen; Durham, Canada West; *Guelph* (upper *Niagara*) *formation*. *V b'*.

Pleurotomaria elegantula. (*Murchisonia elegantula*. Hall, Trans Alb. Inst. 1856, Vol. 4. *Pleurotomaria shumardi*, Meek & Worthen, Illinois Rt. Vol. 2, 1866, plate 18). Whitfield, Bull. 3 Am. Mus. plate 9, fig. 19. (Collett's Indiana Rt. 1882, page 358, plate 32, fig. 19, *magnified twice*, type specimen). Has only six whorls, out of seven or eight, in the specimen figured. Spergen Hill, etc., Ind. *Subcarboniferous*. *XI*.

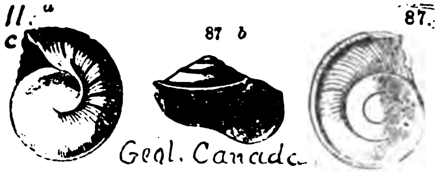


Pleurotomaria ella, Hall, Pal. N. Y., Vol. V, ii, page 72, *Hamilton*. *VIII c*.

Pleurotomaria elora, Billings. Geology of Canada, 1863, page 342, fig. 348. Found in the *Guelph beds*, lying above the *Niagara formation* in Western Canada. *V b'*.



Pleurotomaria eugenia, Billings. Geology of Canada, 1863, page 144, fig. 87, *a*, *b*, *c*, three different views of the same specimen. From the *Trenton limestone formation*. *II c*.



Pleurotomaria euomphaloides, Hall. 15th Annual Report, 1862, page 46, plate 6, fig. 4. Surface concentrically striate, with a band on the periphery; almost always in casts; spire lower than in *P. sulcomarginatus;* possibly casts belong really to *P. rotalia,* but spire lower, and diameter less. *Hamilton strata,* eastern and middle N. Y., *VIII c.*

P. exigua, Winchell; **P. filitexta,** Hall. (S. A. M.)

Pleurotomaria galtensis, Billings. Geology of Canada, 1863, page 343, fig. 349. From the *Galt,* or *Guelph* (just above the *Niagara*) *formation* in Western Canada. *V b'.*

349

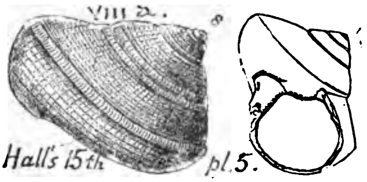
P. giffordi, Worthen; **P. glandula,** Shumard; **P. gonopleura,** Winch. & Marcy; **P. granulostriata.** (S. A. M.)

Pleurotomaria gracilis is reported by C. E. Hall (T3 p. 367) to be found by him occasionally in some of the beds at the top of the *Trenton formation,* on the Little Juniata, river in Huntingdon Co. He probably meant **Murchisonia gracilis,** which see. *II c.*

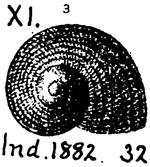
Pleurotomaria grayvillensis, Norwood & Pratten, Jour. Acad. Nat. Sci. [2] Vol. 3, 1855. *Coal measures.—See above* **Platystoma grayvillense.** — In Pennsylvania recognized by Stevenson and White in the *Ferriferous limestone* quarries of Beaver Co., south bank of Ohio river, below Raccoon Creek (K, 346; Q, 62); in Lawrence Co. (Q2, 47, 106); in Mercer Co. (Q3, 25); in Butler Co. (V, 147.)—Also by White in the underlying shales, over the *Scrubgrass coal,* (Q3, 78.)—Also by Stevenson in the *Decker's creek shale* under the Mahoning sandstone at Morgantown, W. Va. (L, 37.)—Also in the *Crinoidal limestone* of the *Barren measures* (Q, 30; L, 36, H4, 78; K3, 310.)—*XIII, XIV.*

Pleurotomaria gregaria, Billings. Geology of Canada 1863, page 119, fig. 29 *a, b, c.* From the *Calciferous sandstone, II a.*

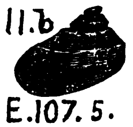
29


VIII a.
Hall's 15th
pl.5.

Pleurotomaria hebe, Hall. 14th Report, 1861, page 105. 15th Report, 1862, plate 5, figs. 8, 9. *Upper Helderberg formation, VIII a.*



Pleurotomaria humilis. Hall, Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3, Amer. Mus. 1882, plate 9, fig. 3. Collett's, 1882, page 353, plate 32, fig. 3, *enlarged four times*, view from above.—Spergen hill, etc., Ind. *Subcarb. XI.*

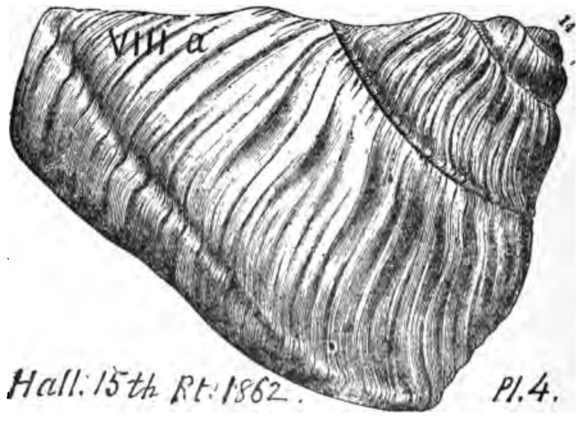


Pleurotomaria indenta, Hall, Pal. N. Y. Vol. 1, 1847, who identifies Emmons' unnamed figure, Geol. N. Y., 2d District, 1842, page 396, fig. 107, 5, from the *Trenton limestone. II c.*

Pleurotomaria inexpectans, Hall & Whitf. Pal. Ohio, Vol. 2,1875,page 117, plate 5, fig. 7, a specimen with the markings of another more perfect one used to complete the figure. Closely related to *P. hebe*, Hall, and also to *P. sulcomarginata*, Conrad. The only species of this type of the genus known in America in strata older than *Upper Helderberg*, differing from the two named by its high spire. *Clinton iron ore* in Clinton Co., O.—*V a.* [*For figure see Appendix.*]

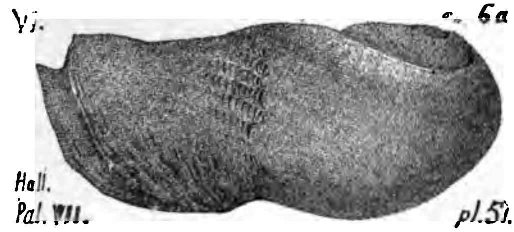
Pleurotomaria itys. See *P. lineata. VIII c.*

Pleurotomaria kearneyi, Hall. 14th An. Rt. 1861, p. 105; 15th An. Rt. 1862, pl. 4. fig. 14.—*Upper Helderberg formation, VIII a.*


VIII a
14
Hall. 15th Rt. 1862.
Pl. 4.

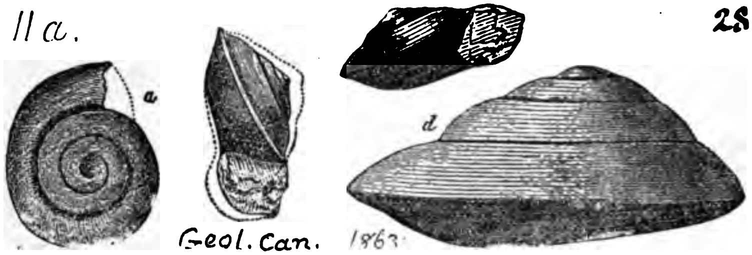
NOTE. S. A. Miller makes this a synonym of *Palæotrochus kearneyi* —

Pleurotomaria labrosa, Hall, Pal. N. Y., Vol. 3, 1861, page. 339, plate 57, fig. 6*a*, profile view looking at the back of a specimen from the *Delthyris shaly* (*Lower Helderberg*) *limestone* of Albany Co., N. Y. Outer surface appears like a net work; all specimens more or less distorted. Species closely resembles *P. balteata*, Phillips, in the English *Wenlock formation* — *VI.*



Pleurotomaria laphami, Whitfield, 1878.— *V b.*

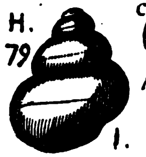
Pleurotomaria laurentina, Billings. Geol. Can. 1863, page 117, fig. 28, *a*, *b*, a small specimen, the dotted lines showing the elevation of the spiral in other specimens; 28 *c*, *d*, other specimens. *Calciferous sandstone formation. II a.*



Pleurotomaria leavenworthana. See **Cyclonema leavenworthana**. *XI.*

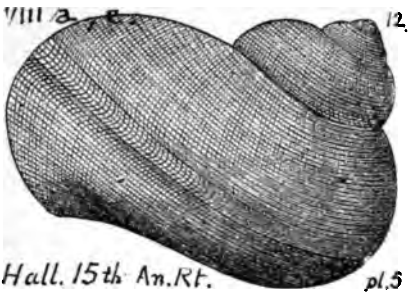
Pleurotomaria lenticularis. See **Raphistoma lenticularis**. *II c.*

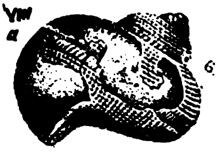
Pleurotomaria lineata, Hall. (now **Pleurotomaria itys**, see Illust. Dev. Foss. 1876.) (*Turbo lineatus*, Hall, Geol. 4th District, N. Y., 1843, page 193, fig. 79, 1.) 15th Annual Report, 1862, page 44, plate 5, fig. 3. Varies in form and proportion from compression, etc. Usually as casts in the top *Hamilton shales* of middle New York, not seldom encrusted with bryozoa or corals. *VIII c.*



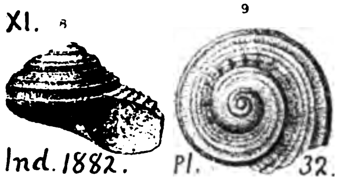
P. litorea, Hall; **P. lonensis**, Walcott.—*II c.*

Pleurotomaria lucina, Hall. (*Euomphalus ? rotundus,* Hall, 1843, p. 172, f. 4; *Pleurotomaria rotundata,* Munster.) 15th. N. Y. Annual Report, 1862, p. 42, pl. 5, fig. 12. Pal. Ohio, Vol. 1, 1873, p. 226, pl. 20, fig. 6, a cast of the interior, retaining bits of thin shell. This round species is easily distinguished, even in compressed casts of the interior. Sometimes concentric striæ coarser than revolving striæ; sometimes the reverse, &c. *Corniferous* of eastern N. Y., *Hamilton shales* of middle New York. *VIII a, VIII c.*

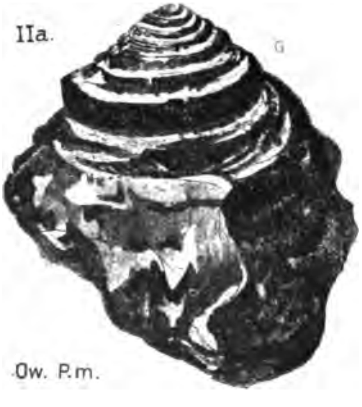




Pleurotomaria meekana. (Hall. Trans. Alb. Inst. Vol. 4, 1856, Whitfield, Am. Mus. Nat. Hist. N. Y., plate 9, figs. 8, 9.) Collett's Indiana Rt. 1882, page 353, plate 32, figs. 8, 9, *enlarged three times ;* side and top views of type specimen, slightly restored. Has the general form of *P. humilis;* but has one or two more whorls which do not increase so rapidly; umbilicus larger; mouth more square. *Subcarboniferous. XI.*



Pleurotomaria muralis. Owen & Shumard. Geology of Wisconsin, Iowa, and Minnesota, 1852. Plate 2, fig. 5, from the Magnesian limestone (F3, of Owen's series), at Lower Fort Geary, Red River of the North. — *Calciferous sandstone,* II *a.*

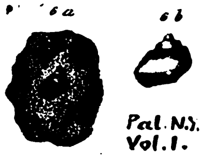


Pleurotomaria modesta, Keyes. Proc. Acad. Nat. Sc. Phila., 1888, page 238, plate 12, figs. 2 a, *b*, a beautiful little whorl-shell from the lately discovered very fossiliferous *lowest coal* No. 3, (= No. 7 of Ill.) pyritous roof shale, containing at least 35 genera and 60 species, at Des Moines, Iowa, just over the *St. Louis* limestone (*XII* being absent.) Possibly identical with *P. depressa*, Cox, a name however pre-occupied by Phillips in 1836 for another shell.—*XIII.*

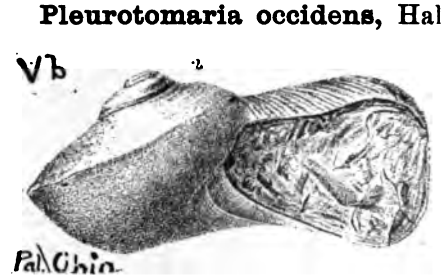
Pleurotomaria nodulostriata. Hall, Trans. Alb. Inst., Vol. 4, 1856. Whitfield, Bull. 3, Am. Mus. Nat. Hist. N. Y., plate 9, fig. 5.—Collett's Indiana Rt. 1882, page 352, plate 32, fig. 5, *magnified four times;* medium specimen. To be known by its depressed conical spire, almost cut off (truncated); granulated surface produced by cross striæ.—Spergen Hill, etc., Indiana. *Subcarboniferous. XI.*

Pleurotomaria pervetusta. See **Euomphalus pervetustus.**

Pleurotomaria ? nucleolata, Hall, Pal. N. Y. Vol. 1, 1847, p. 42, plate 10, fig. 6 *a*, *nat. size;* 6 *b*, *enlarged;* the last whorl composing almost the entire shell; a small distinct species observed by Hall at no other horizon but that of the upper part of the *Bird's-eye limestone formation*, at Watertown, Jefferson Co., N. Y.—In Pennsylvania found by H. D. Rogers (Geol. Pa., 1858, Vol. 2, page 817.)—*Trenton* [?] *II c.*

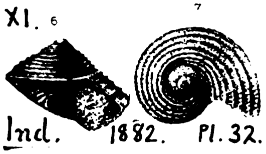

6a
6b
Pal. N.Y.
Vol. 1.

Pleurotomaria occidens, Hall, 20th Regents Rpt. N. Y. 1867, *Niagara.* Pal. Ohio, Vol. 2, 1875, page 142, plate 8, fig. 2, side view of aperture and volutions, streaked with strong revolving lines, or ridges, and apparently also with cross lines; shell flatter in Ohio than in States further west, probably because of greater weight of Coal mea-

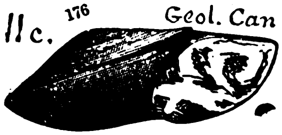


sures above their habitat. Closely related to *P. labrosa*, Hall, of N. Y. Low. Helderberg.—Yellow Spring, O.—*Niagara limestone. V b.*

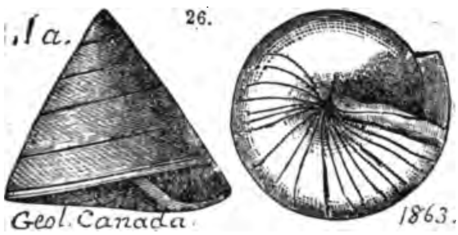
Pleurotomaria pauper. See **Trochonema pauper.** *V b.*



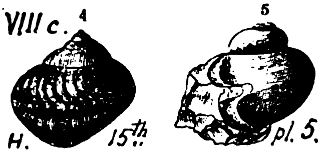
Pleurotomaria piasensis. (Hall, Trans. Alb. Inst. Vol. 4, 1856, Whitfield, Bull. 3, Am. Mus. Nat. Hist. N. Y., 1882, plate 9, figs. 6, 7) Collett's Indiana Rt., 1882, page 354, plate 32, figs. 6, 7, *magnified three times*, side and top view of specimen with sharp edge all round. Differs slightly from *P. humilis.*—Piasa Creek above Alton, Ill. *Subcarboniferous. XI.*



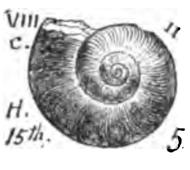
Pleurotomaria progne, Billings, Geology of Canada, 1863, page 181, fig. 176. *Trenton limestone formation. II c.*



Pleurotomaria ramsayi. Billings, Geology of Canada, 1863, page 117, fig. 26 *a*, *b*. Found in the *Calciferous formation. II a.*

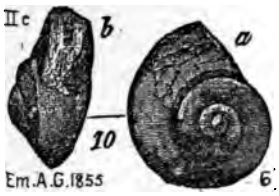


Pleurotomaria regulata, Hall, 14th Annual Report, 1861, page 108. 15th An. Rt., 1862, plate 5, figs. 4, 5. *Hamilton formation, VIII c.*

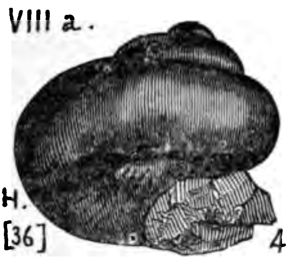


Pleurotomaria rotalia, Hall, 15th An. Rt. N. Y., 1862, page 46, plate 5, fig. 11. Has nearly the form of *P. sulcomarginata*, but no keel, and no sharp raised striæ. Largest specimens ½ inch in diameter, and ⅜ high. Found at Platt's Rock, N. Y., in *Hamilton calc. shale. VIII c.*

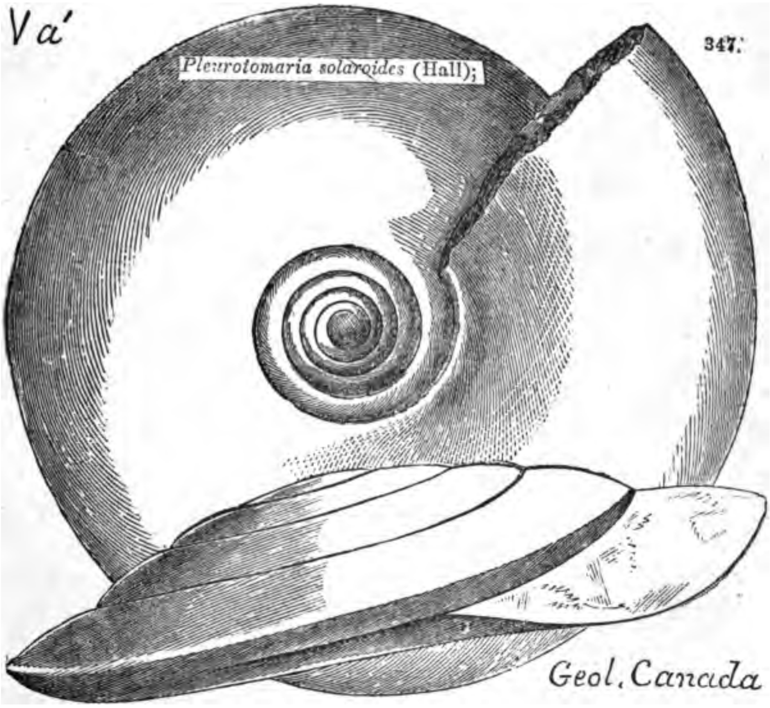
Pleurotomaria rotuloides. (Hall, Pal. N. Y., 1847, Black River and Trenton limestones.) Emmons, Amer. Geol. Vol. 1, pl. 2, 1855, p. 161, plate 6, fig. 10; about 4 whorls, outer one concave below; margin angular; umbilicus small; striated. Resembles *P. lenticularis*. *Trenton. II c.*



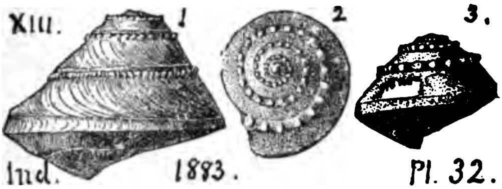
Pleurotomaria rotunda (*Enomphalus rotundus*), Hall, Geol. Fourth District, N. Y., 1843, page 172, fig. 68, 4. *Corniferous formation. VIII a.*



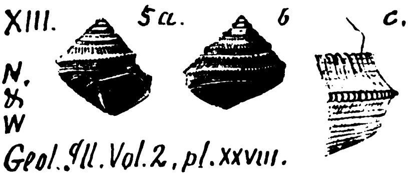
Pleurotomaria solaroides, Hall, Geol. Canada, 1863, page



341, fig. 347 *a, b*. *Guelph*, or *Galt*, formation (over *Niagara*) in Upper Canada. *V b*.

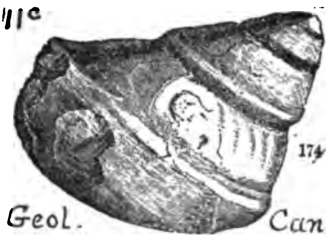


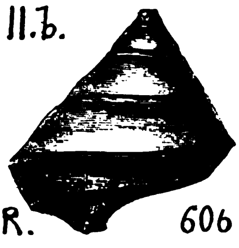
Pleurotomaria sphærulata. (Conrad. Jour. Acad. Nat. Sci. Phila. Vol. 8, 1842, page 272, plate 16, fig. 13). Collett's Indiana Rt. 1883, plate 32, fig. 1, *natural size*, large individual, figs. 2, 3, smaller one. Near *P. wortheni*. Ranges, with many variety of form, from Pennsylvania to Utah, in the *Upper coal measures* (especially Indiana coal K). *XV*.


XIII.
5a.
6
c.
N. & W
Geol. Ill. Vol. 2, pl. XXVIII.

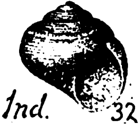
Pleurotomaria speciosa, Meek and Worthen. Prac. Acad. Nat. Sci. Phil. 1860. M. & W. Geol. Ill., Vol. 2, 1866, page 352, plate 28, figs. 5*a*, *b*, *c*, *Lower coal measures* — In Pennsylvania recognized by Stevenson (L, 37) in the *Decker's creek shale*, under the Mahoning sandstone, at Morgantown, W. Va.—*XIII*.

Pleurotomaria subangulata. See **Cyclonema subangulatum.** *XI*.





Pleurotomaria subconica, Hall. Pal. N. Y. Vol. 1, 1847, *Black river. Trenton and Hudson river.* —Geology of Canada, 1863, page 180, fig. 174, *Trenton formation. II c.* Rogers, page 819, fig. 606. *II c*, *III b*.

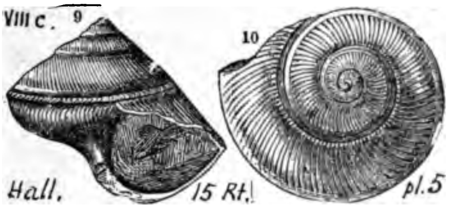


Pleurotomaria subglobosa (*Pleurotomaria rotundata*). Hall. Trans. Alb. Inst. Vol. 4, 1856. *Pleu. subglobosa*. S. A. Miller's catalogue, 1887). Whitfield, Bull. 3, Am. Mus. Nat. Hist. 1883, plate 9, fig. 10. Collett's Indiana Rt. 1882, page 355, plate 32, fig. 10; a well marked, easily distinguished species, both whole and in casts, if the outer whorls are preserved; obscure spiral band. Alton, Ill.; Spergen Hill, etc. *Subcarboniferous. XI.*

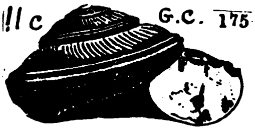
Pleurotomaria subtilistriata. (Hall. Pal. N. Y. Vol. 1, 1847, Trenton). Emmons, Amer. Geol. I, ii, 1855, 233, plate 6, figs. 11, 12; 4 or 5 whorls; smooth, or extremely fine striæ; mouth transverse, somewhat triangular. *Trenton formation. II c.*—S. A Miller makes this a synonym of *Raphistoma subtilistriatum.* 1889.

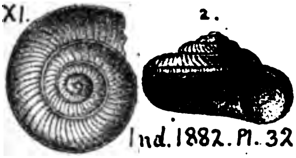
Pleurotomaria subtnrbinata, Meek & Hayden, Proc. A. N. S. Phil. 1858.—*XIII.*

Pleurotomaria sulcomarginata, Conrad. Jour. Acad. Nat. Sci. Phila. Vol. 8, 1842, p. 272, pl. 16, fig. 13. Hall's 15th An. Rt. N. Y. 1862, p. 46, pl. 5, figs. 9, 10. *The commonest Pleurotomaria in the Hamilton formation;* found from Seneca Lake to the Hudson; often abundant in Madison county shales. West of Seneca lake rarer and with short vertical range. Casts often rounded on the periphery, and some of them in Maryland 1½ inch diameter, with five whorls.—In Pennsylvania, recognized by Claypole in Perry Co., *Hamilton rocks.* (F2, preface). Catalogue in OOO, specimens 2-24 (two) 196–2 (eight).—In Huntingdon Co. Cove station RR. cut near Bedford line, in bottom beds of *Hamilton middle shales.* (T3, p. 111).—In Monroe Co., Chance's specimen 801–23, from 1½ miles N. of Craig's meadow, Marshall's creek (identified by J Hall, 1888); 807–13, Kintner's farm, 1 m. S. W. of Marshall's falls.—In Pike Co. Fellow's spec. 808–25, Dingman's Falls. All from *Hamilton, VIII c.* NOTE. Spec. 872–40 came from the *Chemung* strata at Nichols, Tioga Co. N. Y.—*VIIIg.*



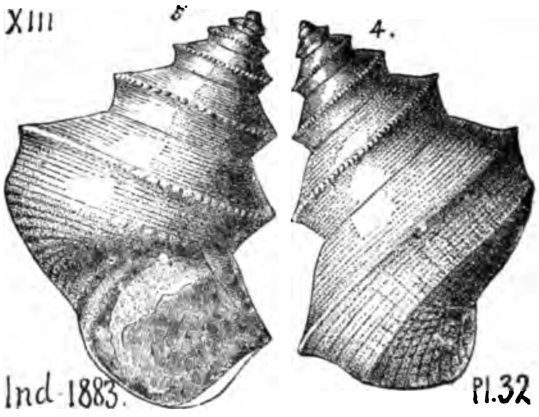
Pleurotomaria supracingulata, Billings, Geology of Canada, 1863, p. 181, fig. 175, *Hudson River (Loraine) formation, IIIb.*





Pleurotomaria swallovana, Hall, Trans. Alb. Inst. Vol. 4, 1856.—Whitfield, Bull. 3, Amer. Mus. Nat. Hist. 1882, pl. 9, figs. 1, 2.—Collett's Indiana Rt. 1882, p. 365, pl. 32, figs. 1, 2, *enlarged four times*, top and side of specimen from Spergen Hill, and at several other places in Indiana it is found. *Subcarboniferous.—XI.*

Pleurotomaria sybillina, Bill.

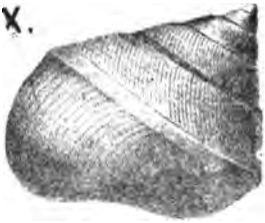


Pleurotomaria tabulata, (Hall. Iowa Report, part 2, p. 721, pl. 29, figs. 12, *a*, *b*). Collett's Indiana Report of 1883, p. 160, pl. 32, figs. 4, 5, *natural size*, opposite views of a large specimen. known in the *Upper Coal Measures* of the west from Indiana to Iowa.—In S. W. Pennsylvania also, Stevenson's Report K3, p. 310.—*XV.*

P. taggarti, Meek.—**P. tectoria**, Winchell.—**P. tenuicincta**, M. and W.

Pleurotomaria tenuimarginata. See **Eotrochus concavus.**

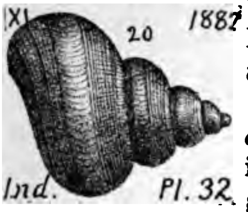
P. tenuistriata, Shumard. Tr. St. Louis Ac.



Pleurotomaria textiligera, Meek. Proc. Acad. Nat. Sci. Phila. 1871.—Pal. Ohio, Vol. 2, 1875, p. 314, pl. 13, fig. 7*a*, mainly an internal cast, but shows indistinct remains of surface markings; 7*b*, gutta-percha cast of upper part of a spire of this shell taken in a natural mold, showing the sharp lines of growth. Supposed by Meek at first to be Hall & Whitfield's *P. mississipiensis*, from the *Burlington limestone*. It is abundant in the *Waverly strata* at Medina, Ohio.—*X.*

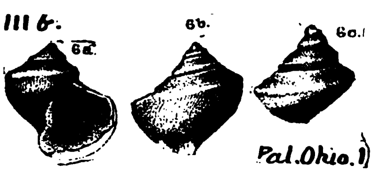
Pleurotomaria thalia. See **Cyclonema thalia.**

Pleurotomaria trilineata. Hall. Trans. Alb. Inst. Vol. 4, 1856, Whitfield, Bull. 3, Am. Mus. Nat. Hist. N. Y. 1882, pl. 9 fig. 20, *enlarged three times*, type specimen. Somewhat resembles *Cyclonema* (*Pleurotomaria*) *leavenworthana*, but cannot be mistaken for it except in casts; distinguished by the revolving grooves on lower part of shell. Spergen Hill, etc., Ind. *Subcarboniferous.*—*XI.*



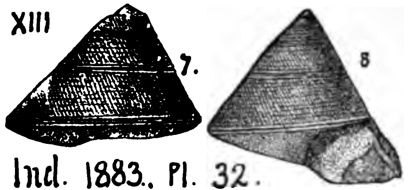
Pleurotomaria trilix, Hall. 15th Annual Report of N. Y. 1862, p. 45, pl. 5, fig. 1; a distinct keel on the last whorl just below the suture; periphery has three keels inclosing two depressed bands on which the concentric striæ are abruptly bent backwards from the aperture. Imperfect specimens, but species readily distinguished. Seneca lake *Hamilton shales.* In Pennsylvania, Perry Co., Claypole's Coll. Spec. 5–12, from Barnett's mill, outcrop of *Hamilton upper shale;* Spec. 74 C–12 (two), from the same outcrop along Soap Hill between N. Bloomfield and Newport; and Spec. 99–12, from Drumgold's tannery on Sherman creek.— *VIIIc.*

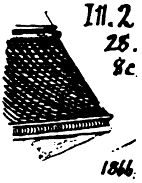
Pleurotomaria (*Scalites?*) **tropidophora,** Meek. Amer. Jour. S. and A. [3] Vol. 4, 1872, *Cincinnati group.* Pal. Ohio, Vol. 1, 1873, page 154, plate 13. figs. 6 *a*, *b*, *c*, *enlarged two diameters.* A shell having some of the characters of both *Pleurotomaria* and of *Scalites.* It has no trace of the revolving band, but its growth lines have the strong oblique backward curve of *Scalites*, etc. Differs from *P. selecta* of Billings. *Hudson river strata* at Cincinnati.—*III b.*



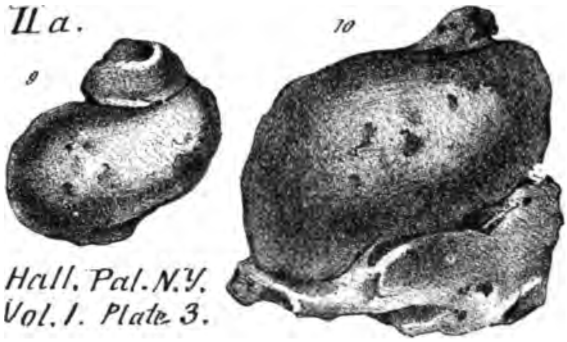
Pleurotomaria tumida. See **Platystoma tumidum.** *XIII.*

Pleurotomaria turbinella, reported by I. C. White from the *Ferriferous limestone* (*Allegheny coal series*) at the quarries, south bank of Ohio river, below Raccoon, Beaver Co., Pa. (K, 346; Q, 62); also Lawrence Co. (Q2, 47, 106); also Mercer Co. (Q3, 25; V, 147).—*XIII.*





Pleurotomaria turbiniformis. Meek & Worthen. Illinois Report of 1866, Vol. 2, plate 28, fig. 8, c.—Collett's Indiana Report of 1883, page 160, plate 32, fig. 7, *natural size;* apex a little broken; fig. 8, opposite view of another specimen. Found at LaSalle and Paris, Ill., and Vigo county, Ind. Also in S. W. Pennsylvania. (J. J. Stevenson, K3, p. 310). *Upper coal measures. XV.*


II a.
9
10
Hall. Pal. N.Y.
Vol. I. Plate 3.

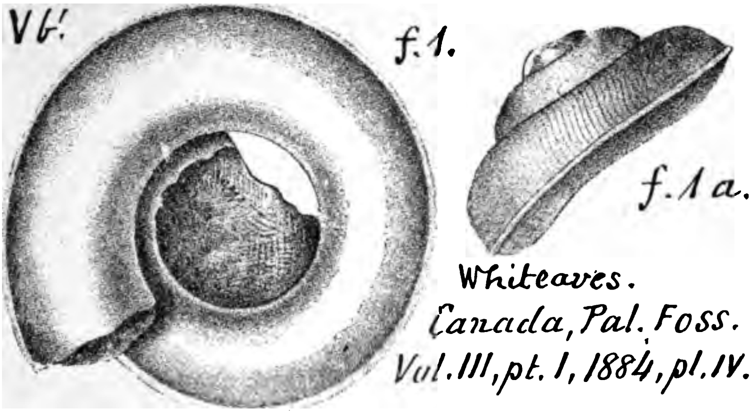
Pleurotomaria ? turgida, Hall. Fal. N.Y. Vol. 1, 1847, page 12, fig. 9, 10, a rough cast of chert in coarse siliceous mass of calciferous sandstone with a mouth like a *Natica*, found in Saratoga Co., N. Y., in the *Calciferous sandstone. II a.* In Geol. Penna. 1858, Vol. 2, page 817 +, H. D. Rogers reports it as abundant in one of the *Trenton group*, (See reference in Report on Blair Co., T, p. 57), viz. *Black river limestone. II c.*—Now **Holopia turgida.** (S. A. M.)

Pleurotomaria umbilicata. See **Trochonema umbilicatum.** *II b, II c, III b.*

Pleurotomaria unisulcata, Conrad, Journal Academy Natural Sciences, Philadelphia, Vol. 8, 1842, page 271, *Kinderhook (subcarboniferous) limestone, XI.*

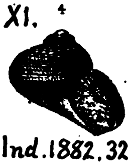
Pleurotomaria valeria, Whiteaves, Pal. Foss. Canada, Vol. 3, pt. 1, 1884, page 23, plate 4, fig. 1, bottom view of type specimen, only a cast; 1 *a*, another, which shows spire and shell, surface markings; species easily distinguished by its flatness, subangular whorls, high keeled periphery, and wide open umbilicus. Canada West. *Guelph formation. V b'.*

(*Figure of Pleurotomaria valeria ; page 720.*)

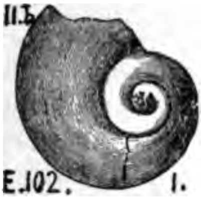


Whiteaves.
Canada, Pal. Foss.
Vol. III, pt. I, 1884, pl. IV.

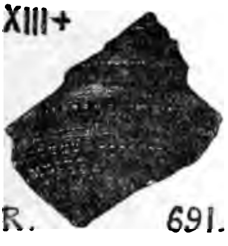
Pleurotomaria wortheni, Hall, Trans. Alb. Inst. Vol. 4, 1856; Iowa report, 1858, plate 23, fig. 13; Whitfield, Bull. 3, Am. Mus. Nat. Hist. 1882, plate 9, fig. 4; Collett's Indiana Rt., 1882, page 356, plate 32, fig. 4, type specimen. Somewhat like *P. sphærulata* of Conrad, *P. coronata*, Hall. Spergen Hill, etc., Ind. *Sub-carboniferous. XI.*



Pleurotomaria —— ? Emmons in his Geology of the Second District of New York, 1842, page 393, gives fig. 102, 1, as common at Watertown, N. Y. *Trenton grey limestone. II c.*



Pleurotomaria —— ? H. D. Rogers in his Geology of Pennsylvania, 1858, Vol. 2, page 833, gives as fig. 691 a side view of a beautiful *Pleurotomaria* from the *Coal measures* of the State. *XIII?*



P. valvatiformis, M. and W.; *viola*, Bill.; *virgo*, Bill.; *virguncula*, Bill.; *vitruvia*. Bill.; *voltumna*, Bill.; *whitei*, Winchell. (S. A. M.)

Pleurotamias of undetermined species are reported from various formations and localities in Pennsylvania, besides the quotations made under the forgoing specific names, to some of which, however, the specimens collected will, on further study, very probably, be found to belong. Thus—

In the *Calciferous sandstone*, *II a*, in Centre Co. Prof. Ewing finds numerous specimens, which may be one or more of the four Canadian forms: *P. calcifera*, *P. gregaria*, *P. laurentina*, or *P. ramsayi*, (hardly the Wisconsin form *P. muralis*); not to mention others not inserted in this book, such as *P. abrupta*, *arabella*, *canadensis*, *miser*, all Canadian forms named by Billings; or *P. turgida*, Hall (T3, 367; T4. 423).

In White's *Selinsgrove lower limestone*, Northumberland Co. which he accounts the base of the *Marcellus*, but which occupies the place of the *Corniferous*, *VIII a*, *Pleurotomarias* are numerous in a crowd of other shells and polyps. (G7, 79, 360.) Claypole's specimen 223–10 is from the same horizon at Centre mills, Madison township, Perry county.

In the *Hamilton middle shales*, in Bedford county, No. 48, of Stevenson's Saxton section, *Pleurotomarias* abound in company of two *Bellerophons*, a *Tropidoleptus*, and a large *Chonetes*. (T2, 83, 231).—*VIII c*.

From *Hamilton sandstone* and *upper slates*, is Claypole's specimen 171–3, got one mile west of Marysville, Perry county; and 196–4 (three) got at Rough and Ready, Huntingdon county. —*VIII c*.

From the *Chemung rocks* in Montebello Narrows, Perry Co., came Claypole's spec. 144–10 (two).—*VIII g*.

In White's *Chemung-Catskill passage beds*, *VIII–IX*, in Columbia county, a formation 1,000 feet thick between the first red bed (2,200′ to 2,500′ above the top of the *Hamilton*) and the first *Catskill fish bed*, a *Pleurotomaria* occurs with Chemung forms which survived far up into the *Catskill* age. (G7, 65, 238, bed No. 45 of the Catawissa section.)—Claypole's spec. 104–15 (a fragment) from the *Kingsmill sandstone*, Perry Co., belongs to this horizon.

From the base of the *Catskill*, Claypole's Perry Co. specimens 93–13, 14, were found with fish fragments of *Holoptychius*.

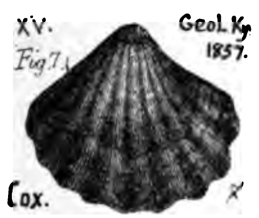
—See also a box full of *Pleurotomarias*, Spec. 93–10, from the *Catskill* near Catawissa, Columbia county.—*IX.*

In the *Pocono sandstone* (*Subcarboniferous*), in Fayette county, on a branch of George's creek, Stevenson found a badly preserved *Pleurotomaria* in company of fish-spines and fish-plates. (K3, 308.)—*X.*

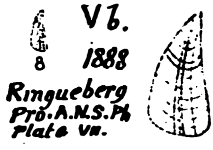
In his *Lower carboniferous* list of S. W. Pennsylvania Stevenson names an undetermined *Pleurotomaria.* (K3, 311.)

In the *Deckers' creek shale*, under the *Mahoning sandstone* (top of Allegheny series or *Lower Productive coal measures*), at Morgantown in W. Va. (L, 37.)—*XIII.*

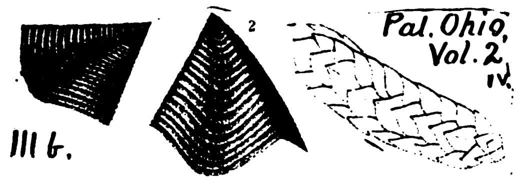
Plicatula (now **Meekella**) **striatocostata**, Cox. Geological Survey of Kentucky, Vol. 3, 1857, page 568, plate 8, fig. 7. Found in the *Great Limestone* above the *Redstone coal* (No. 11 of the Kentucky series), at Providence, Hopkins Co., Ky.—*Upper coal measures.*—*XV.*



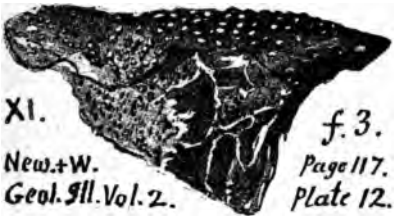
Plumulites gracilissimus, Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, 1888, part 2, page 136, plate 7, fig. 8, *nat. size*; 8a, *enlarged three diameters* plate excessively delicate and frail approaches *P. minimus*, Barrande, but longer; and has a narrower central ridge than *P. delicatus*, Barr. Its fine side striation is quite distinctive. Lower third of *Niagara shale* at Lockport. *V b.*



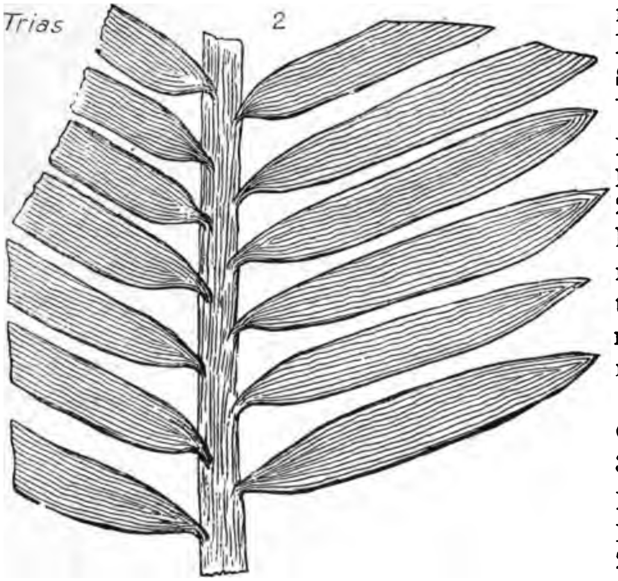
Plumulites jamesi, Hall & Whitfield, Pal. Ohio, Vol. 2, 1875, page 106, plate 4, figs. 1, 2, greatly enlarged detached plates of specimens from Cincinnati; H. Woodward's outline tracing (*nat. size*) of perfect specimen (Q. Jour. Geol. Soc. London, Vol. 21, plate 14, fig. *1 h*) for illustration and comparison. (Apparently identical fragments are seen on *Trenton limestone* surface near Trenton Falls, N. Y.—In Pennsylvania,



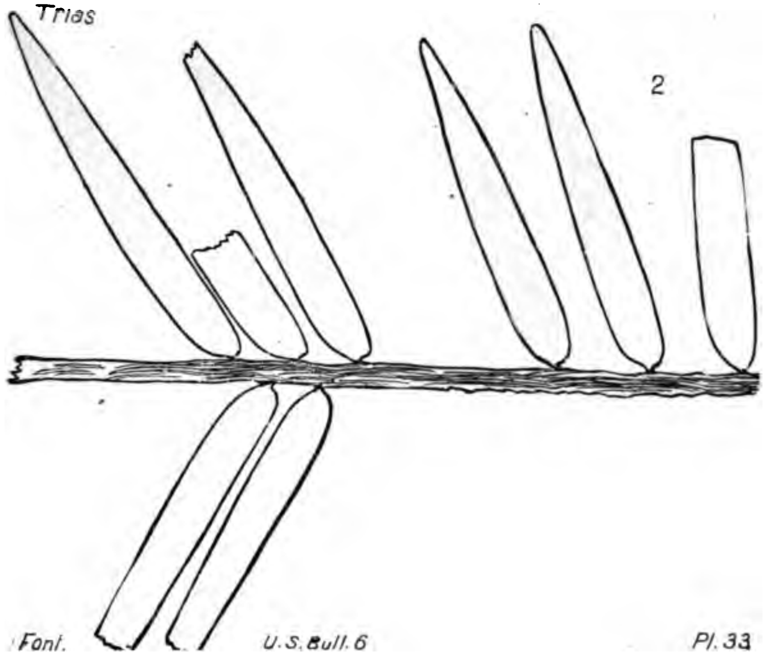
eight specimens (Nos. 210-140) were collected from *Trenton limestone* at Bellefonte, Centre Co. (OOO, page 188.)—*IIc, III b.*—*Plumulites* a genus of *Trilobites*, Barrande.



Pnigeacanthus (*Oracanthus*) **pnigeus**, Newberry & Worthen, Geo. Sur. Ill., Vol. 2, 1866, page 117, plate 12, fig. 3, a fragment of fish-spine, the body of which was originally cartilaginous, covered with a thin bony ornamented crust, ending in a solid bony point. The inside substance decaying, the shell has been crushed in, and the opposite surfaces brought together, making a flat plate of extreme thinness, but leaving the bony tip unchanged. Resembles *Oracanthus abbreviatus*, Newb. from the Ohio *Devonian* more than any other; but differs in having distinctly star-shaped tubercles, arranged partly in lines, instead of smooth tubercles scattered over the surface. *Keokuk limestone. XI.*

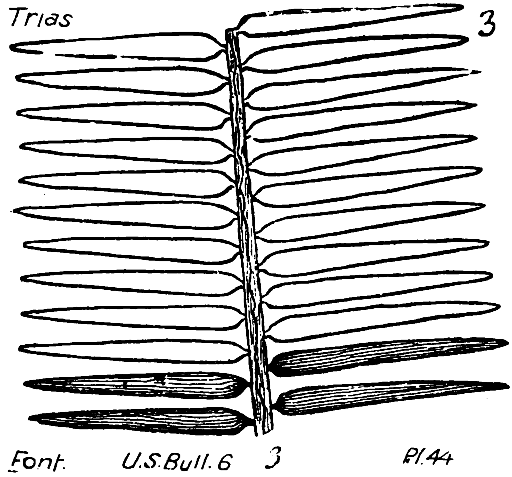


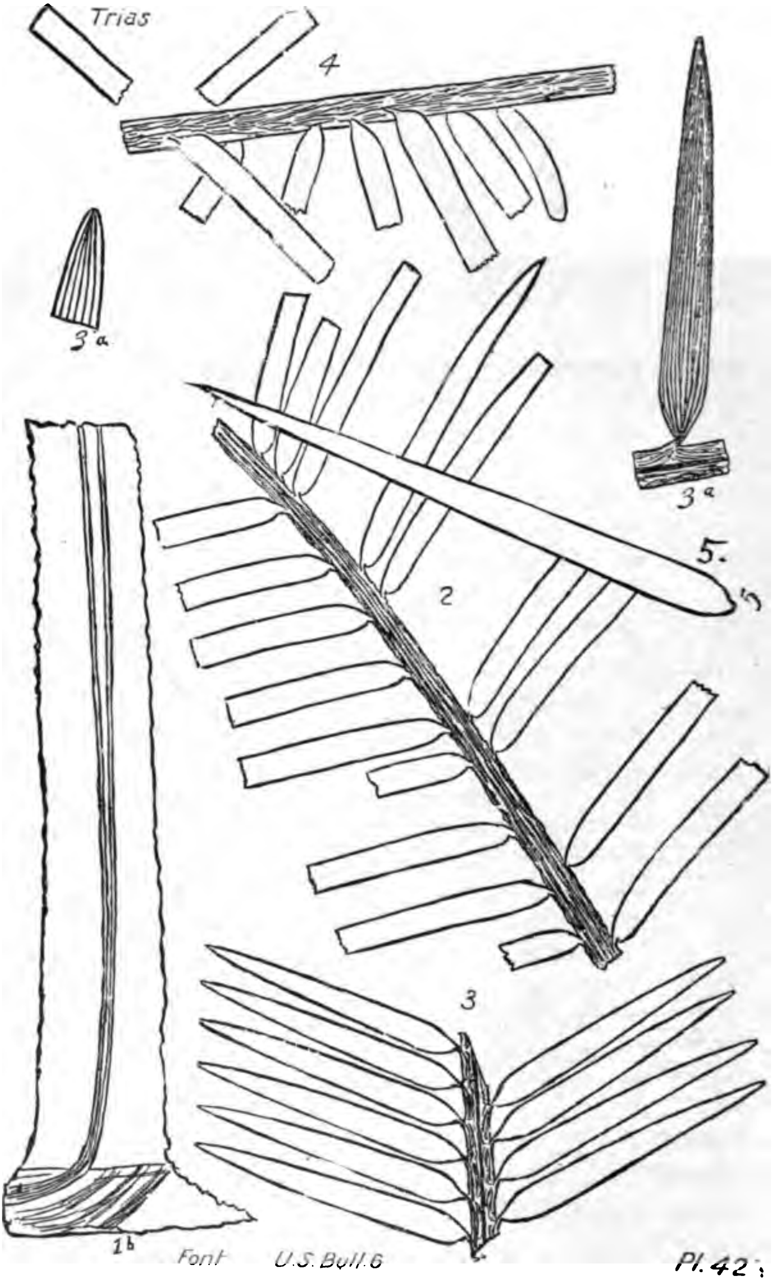
Podozamites emmonsi, Fontaine (*P. lanceolatus*, Emmons.) — Monogr. U. S. Geol. Sur. Vol. 6, 1883, page 77, plate 33, fig. 2, with leaflets rather narrower than Emmons' normal form (in Amer. Geol. plate 3, fig. 7), page 110, plate 53, fig. 2. A fine plant mistaken by Emmons for the English *Zamites lanceolatus*. L. &



H. (changed by Schimper to *Podozamites lanceolatus.*) It suggests very strongly an affinity with some conifers. Detached leaves numerous at Ellingtons, N. C.—*Trias. Rhætic?*

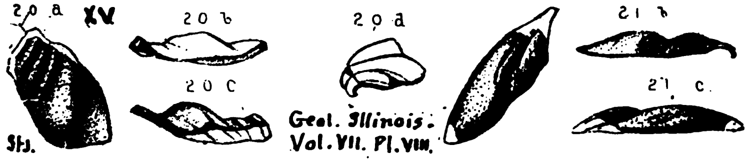
Podozamites tenuistriatus, (*Zamites tenuistriatus*, W. B. Rogers.) Fontaine. Monograph U. S. Geol. Sur. Vol. 6, 1883, p. 78, plate 42, fig. 2, largest leaf; 3, normal size; 3*a*, *magnified* nervation, 3*b*, more *magnified* top of 3a; 4, leaflets inserted (flattened, from above?); 5, largest leaflet. Plate 44, fig. 3; leaflets broad near insertion, where alone the fine nerva-




Trias
4
3a
3 a
5.
2
1b
3
Font U.S. Bull. 6
Pl. 42

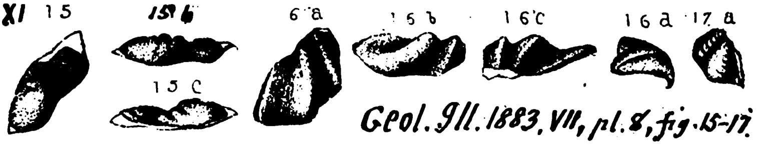
tion can be distinguished. Like *P. angustifolius*, Schenk, Europe, *Rhætic*, but leaflets less remote, and not inserted at so much of an angle. Rarely found attached to stem; abundantly scattered over the coal shales; stripped stems mingled with them. This is the most abundant *Podozamite* in the Virginia *Mesozoic*, and widely diffused; one of the plants found in the Cumberland area; occurs at all plant localities in the Richmond field.—*Trias*. (*Rhætic*, Fontaine.)

Poecilodus carbonarius, St. John & Worthen, Geo. Sur.



Ill., Vol. 7, 1883, p. 139, pl. 8, figs. 20*a*, back upper right tooth, of medium or small size, seen from above; *b*, inner margin; *c*, outer inrolled edge; *d*, front-side edge; 21*a*, back lower right tooth; *b*, *c*, inner and outer edges. Lasalle, Ill., *Upper coal measures*. NOTE. One specimen of this fish tooth also from Belleville, from limestone 20′ over coal 6, and others at Carlinville, roof of coal 5.—*XV.*

Poecilodus cestriensis, St. John & Worthen, Geo. Sur.



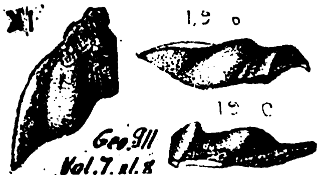
Ill., Vol. 7, 1883, p. 135, pl. 8, figs. 15*a*, lower back right tooth of medium or small size, crown; *b*, *c*, inner and outer edges; 16*a*, *b*, *c*, upper back left tooth, crown outer edge, and front side edge; 17*a*, small example, showing the characteristic transverse corrugations distinguishing it from the European *P. jonesii*, and *P. obliquus*, of Agassiz. Chester, Ill. *Chester limestone.—XI.*

Poecilodus jonesi, the European type species of this genus, established by Agassiz in his Research. Poiss. Foss. 1833. (S. A. M.)

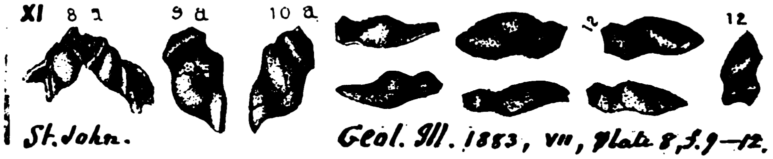
Poecilodus ornatus. See **Chitonodus rugosus**.—*XI.*

Poecilodus rugosus. See **Chitonodus rugosus**.—*XI.*

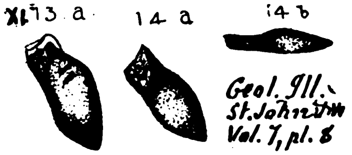
Poecilodus springeri, St. John & Worthen, Geo. Sur. Ill., Vol. 7, 1883, p. 138, pl. 8, figs. 19*a*, upper back left tooth, crown; *b*, inside edge; *c*, outside inrolled edge. Sante Fè, N. Mex., *Subcarboniferous.—XI.*



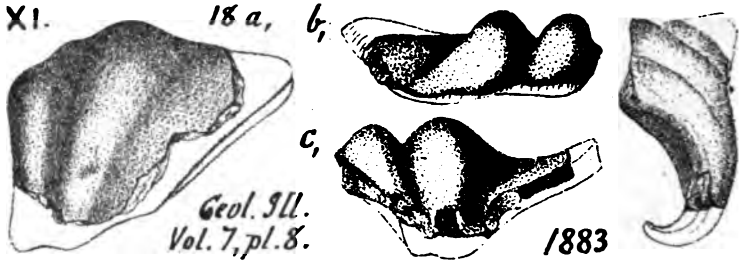
Poecilodus stludovici, St. John & Worthen, Geo. Sur. Ill., Vol. 7, 1883, p. 132, pl. 8, figs. 8*a*, mandible, with pair of back teeth in place, resting on the granular bony support, right jaw, showing joint at the end; front end of jaw mutilated, but it is evident that whatever teeth it bore must have been extremely small; 9*a*, upper back tooth, right jaw, crown; 10*a*, *b*, *c*, ditto, left jaw, crown, outer and inner edges; 11*a*, *b*, lower back right tooth, crown and outer edge; 12*a*, *b*, *c*, ditto, crown, inner edge, and front side edge. Alton, Ill. *St. Louis limestone.—XI.*


XI 8 a
9 a
10 a
11
12
St. John.
Geol. Ill. 1883, vii, plate 8, f. 9–12.

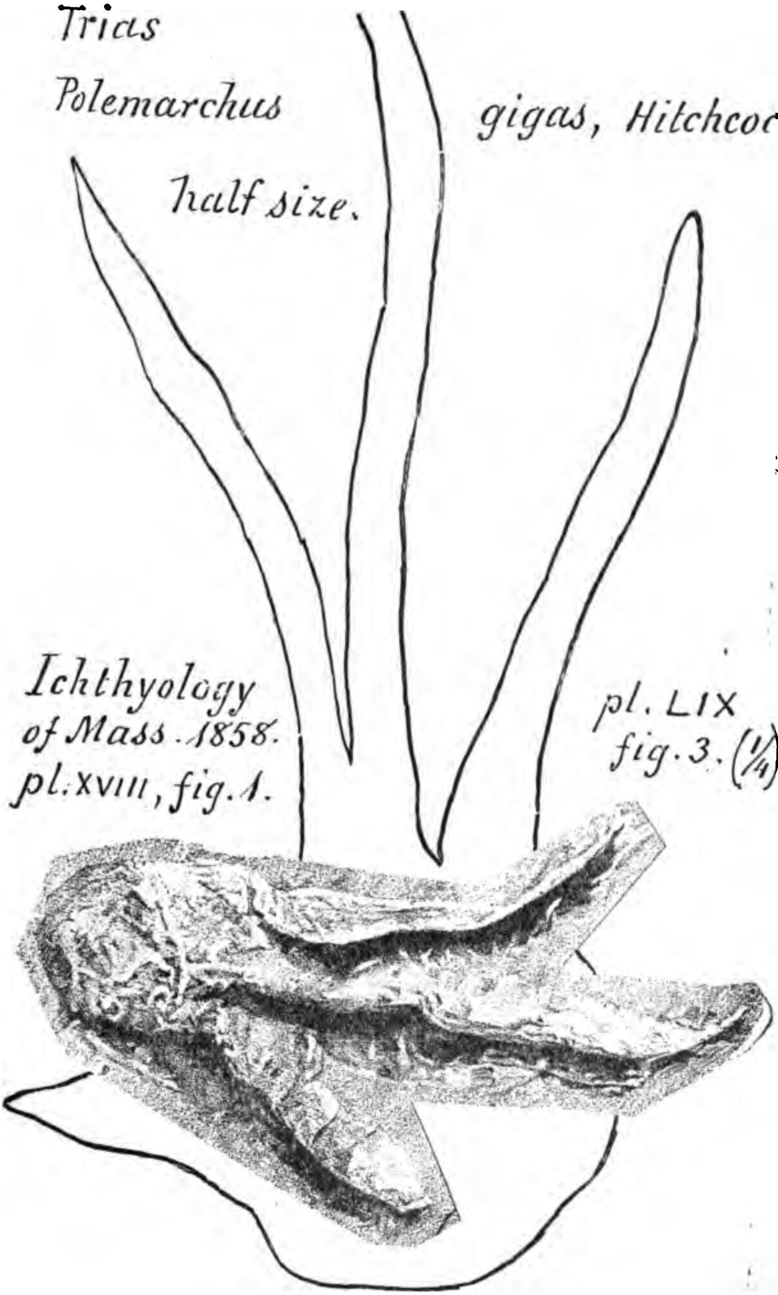
Poecilodus varsoviensis, St. John & Worthen, Geo. Sur. Ill., Vol. 7, 1883, p. 131, pl. 8, figs. 13*a*, *enlarged twice*, lower back left tooth; 14*a*, large example crown of tooth; *b*, inner edge. Warsaw, Ill. *Subcarboniferous limestone.—XI.*



Poecilodus wortheni, St. John, Geo. Sur. Ill., Vol. 7, 1883,



p. 136, pl. 8, fig. 18*a*, upper back left jaw fish tooth, seen from above, partially restored in outline; *b*, cross profile, inner edge;



Trias

Polemarchus gigas, Hitchcock

half size.

Ichthyology
of Mass. 1858.
pl. XVIII, fig. 1.

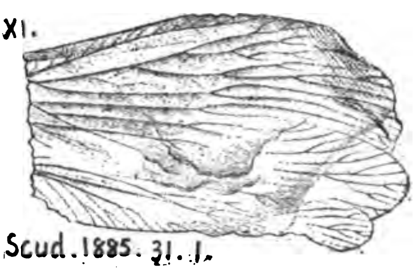
pl. LIX
fig. 3. (1/4)

c, outer inrolled edge; *d*, profile lengthwise of front side edge. Chester, Ill., *Chester limestone* (under *Conglomerate*). Distinct from all other known species, and a unique specimen from above the Chester fish bed which hand yielded most fish remains. It is the largest known species of this kind of fish.—*XI.*

Polemarchus gigas, E. Hitchcock, Ichthyology of Mass. 1858, p. 107, 181, pl. 18, fig. 1, outline *natural size* (*reduced here to one-half*) of the high foot of a supposed crocodilian (?) reptile; pl. 59, fig. 3 (*one-fourth natural size*). An impression in the *Connecticut river red shale formation* at Chicopee falls, Mass., in the bed of the river; found also at Cabotville, Mass. No fore-foot print found; no web between the toes as in the shorter toed crocodiles; but a ten foot long crocodile has a foot scarcely ten inches long, and it might be that this lizard was fifteen feet long, with a foot fifteen inches long. Found by C. H. Hitchcock (see MS. letter, Dec. 18, 1888) at the quarry at Milford, N. J., on the Delaware (ten miles below Durham creek in Bucks Co., Pa., and three miles from the mountain; therefore in the upper beds of the *Trias.* (*Rhætic*, Fontaine.)

Poliochera punctulata. Scudder. A spider from Mazon Cr., Ill., in Lacoe's collection at Pittston, Pa. Proc. Am. Acad. Vol. 20, p. 16. *Coal measures.* *XIII.*

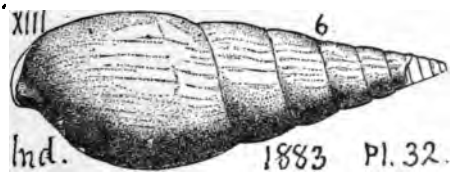
Polyernus laminarum, Scudder. Memoirs of the Boston Society of Natural History, 1885, plate 31, fig. 1, found in the black shale base of Campbell's ledge Conglomerate, in the gap of the Susquehanna North Branch above Pittston, Luzerne Co. Pa. Lacoe's collection. *XII.*



Polyernus complanatus, Scudder. A flying insect from a Mazon Cr. nodule, Ill. Mem. Bost. S. N. H. Vol. 3, 1885, p. 343, pl. 32, figs. 8, 11. In Lacoe's collection at Pittston, Pa. *Coal measures.* *XIII.*

Polygnathus coronatus, crassus, cristatus, curvatus, dubius, duplicatus, eriensis, immersus, linguiformis, nasutus, palmatus, pennatus, princeps, punctatus, radiatus, serratus, simplex, solidus, truncatus, and tuberculosus, are twenty species of minute teeth and tuberculated plates found in *Hamilton* strata, *VIII c*. Hinde, in Q. J. G. S. Lond. 1879. (S. A. M.)

Polyphemopsis ? fusiformis Collett's Indiana Report of 1880, where it was made identical with Hall's *Macrocheilus fusiformis*. Figure from Collett's Ind. Rt. of 1883, page 164, plate 32, fig. 6, *natural size*, a shell from Newport, Ind., which may be a *Soleniscus*. *Coal measures*. *XIII*.

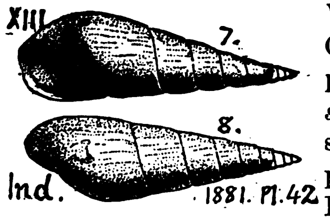


Polyphemopsis bulimorphis. See **Bulimorpha bul.** *XI*.

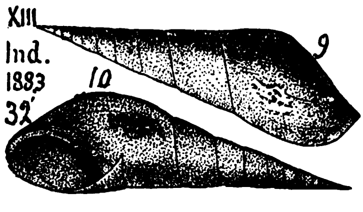
Polyphemopsis canaliculata. See **Bulimorpha canal.** *XI*.

Polyphemopsis elongata. See **Bulimorpha elongata.** *XI*.

Polyphemopsis nitidula (*Loxonema nitidula*, Meek and Worthen, 1860, Proc. A. N. S. Phila.) Collett's Indiana Report of 1881, page 370, plate 42, figs. 7, 8, *natural size*, front and back views of a large specimen. Also, Rt. 1883, page 163, plate 27, figs. 7, 8, *natural size*.—Eugene, Vermillion Co., Indiana. *Coal measures*. *XIII*.



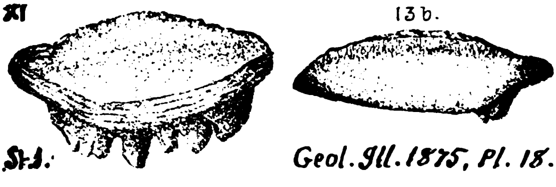
Polyphemopsis peracuta. (Meek and Worthen Illinois Report, Vol. 2, p. 375, plate 31, fig. 7 *a*, *b*). Collett's Indiana Rt. of 1883, page 163, plate 32, figs. 7, 8, *natural size*, opposite side views; not very common; supposed to be characteristic of the *Upper Coal measures* (coals M & N of the Indiana list); but it abounds in the *Ferriferous Limestone* of Western Pennsylvania; see. Stevenson's Report K, page 346; K3, 310; White's Q, 62, 200; Q2, 47, 106; Q3, 25; Chance's V, 147. Also in the *Decker's Creek shale* at Morgantown, L, 37. Also in the *Crinoidal limestone*, H4, 78. It belongs therefore to *Alleghany series* and *Pittsburgh series*, *XIII*, *XIV*.



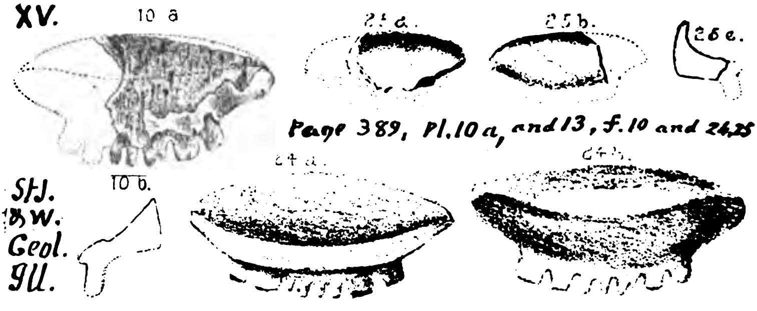
Polypi. Polyps. An extensive class of Palæozoic fossils, divided into two orders: the ZOANTHARIA, and the ALCYONARIA. The first includes the seven families of *Astræidæ*, *Cyathophyllidæ*, *Cyathaxonidæ*, *Favositidæ*, *Halysitidæ*, *Milleporidæ*, and *Poritidæ*. The second includes the three families of *Alcyonidæ*, *Tubiporidæ*, and *Graptolitidæ*. (S. A. Miller's cat. 1877, 1883.)—Many of the genera and species are characteristic of formations; for example, the *Lithostrotion*, which, in Warren, Pa., and along the Allegheny mountain southward into Alabama, and westward into Kentucky, marks the *Mauch Chunk red shale horizon* (*XI*) between the Subcarboniferous *Pocono conglomerate* (*X*) beneath it, and the Carboniferous *Pottsville conglomerate* (*XII*) over it. See Randall's section in Carll's Report I, page 53, etc., etc.

Polypora —— ? Claypole's specimen 5–1, from Barnett's Mill, Perry Co., Pa. in *Hamilton upper shale*. *VIII c.*

Polyrhizodus amplus. St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 387, plate 13. figs 13*a* *b*, perfect fish-tooth, concave and convex surfaces, from Alton, Ill. Not rare in the *St. Louis limestone subcarboniferous.*) *XI.*

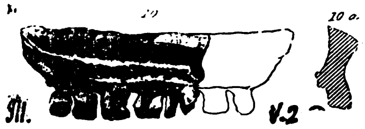

XI
13 b.
St.J.
Geol. Ill. 1875, Pl. 13.

Polyrhizodus carbonarius. St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 389, plate 10*a*, figs. 24*a*, to 25*c*, and plate 13, fig. 10*a*. Appearance of the original example, con-

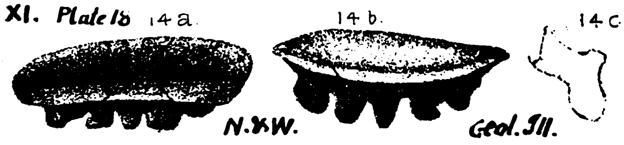

XV.
10 a
25 a.
25 b.
25 c.
Page 389, Pl. 10 a, and 13, f. 10 and 24,25
24 a.
24 b.
10 b.
St.J. & W. Geol. Ill.

vex face of the fish-tooth, partially restored in outline; *b*, profile section. Belleville, Ill., from limestone over coal 5 (?); a smaller ex. of this species (?) from limestone over coal 8.—*XIII-XV?*

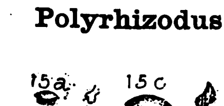
Polyrhizodus dentatus, Newberry & Worthen, Geo. Sur. Ill., Vol. 2, 1866, page 60, plate 3, figs. 10, 10*a*, hind view, and section of a fish-tooth, which has a strong family resemblance to *Chomatodus multiplicatus*, and *C. loriformis*, through which two it is related to the solid-toothed *Petalodonts*; but its root is divided into distinct radicles, like *P. ponticulus*. Chester, Ill. *Chester limestone* (next under the *Conglomerate.*)—*XI.*



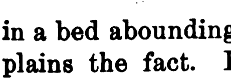
Polyrhizodus littoni, St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 385, plate 13, figs. 14*a*, *b*, *c*, nearly perfect fish-tooth, concave and convex faces, and profile section, to compare with *P. williamsi*, St. John & Worthen; from Alton, Ill. *St. Louis limestone.* *XI.*



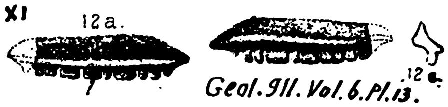
Polyrhizodus modestus, Newberry, Pal. Ohio, Vol. 2, 1875, page 50, plate 58, fig. 10, front face; 10 *a*, profile of the only complete little tooth found, with fragments of others, in the *Cleveland shale*, Bedford, Cuyahoga. Co., evidently different from the other species of this genus of fish (McCoy, 1848) figured in the Geol. Reports of Illinois, Vol. 2.—*VIII-X.*



Polyrhizodus nanus, St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 386, plate 13, figs. 15, *a*, *b*, convex face and section of little dwarf (nanus) fish-tooth; *c*, *d*, *enlargements* X2, of the same; unique specimen, although found in a bed abounding in fish-teeth, etc., but its minute size explains the fact. Bentonsport, Iowa; upper part of *Keokuk limestone.* *XI.*

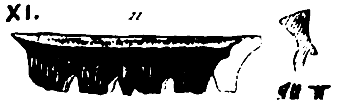


Polyrhizodus pisaensis, St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 386, plate 13, figs. 12 *a*, *b*, *c*, concave face, convex face, and profile of a nearly perfect, and quite unique fish-tooth, found in the *Warsaw limestone beds*, a mile above Pisa creek, Ill. *XI?*

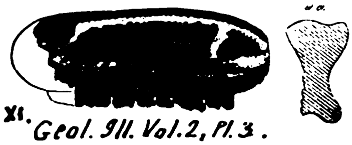


Geol. Ill. Vol. 6. Pl. 13.

Polyrhizodus ponticulus, Newberry & Worthen, Geo. Sur. Ill., Vol. 2, 1866, page 51, plate 3, figs. 11, 11 *a*, *natural size*, front view, and profile; the roots of this fish-tooth curiously suggests a stone arched bridge, whence its name. Classed with McCoy's Irish *P. magnus*, but not his *P. pusillus*. Chester, Ill. *Chester limestone*. *XI.*

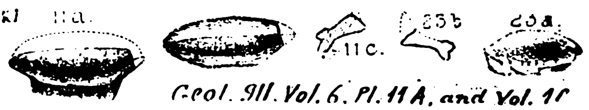


Polyrhizodus porosus, Newberry & Worthen, Geo. Sur. Ill. Vol. ,2, 1866, page 49, plate 3, figs. 9, 9*a*, *natural size*, hind face and section of the largest found fish tooth, thick and massive, differing somewhat from McCoy's Irish *P. magnus;* Burlington and Quincy, Ill., *Burlington limestone* (next to the bottom division of subcarboniferous.) *XI.*



Geol. Ill. Vol. 2, Pl. 3.

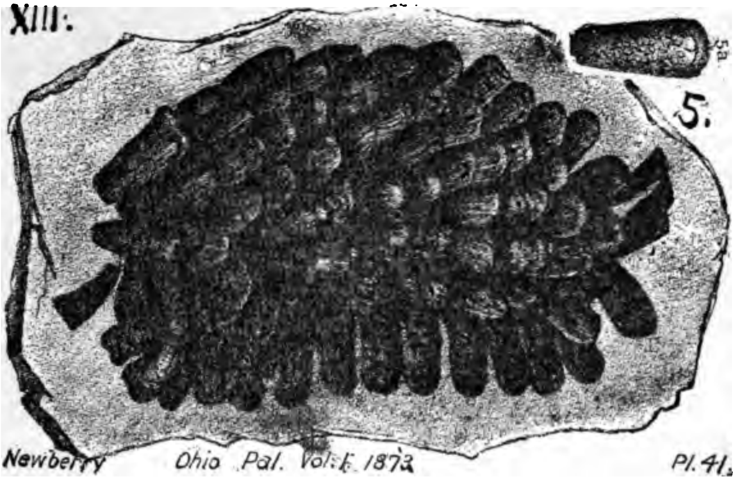
Polyrhizodus williamsi, St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 284, plate 13. fig. 11*a*, concave face, showing toothshaped root of this tooth; *b*, crown and triturating convex surface; *c*, profile; plate 10 A. figs. 23*a*, *b*, Boonville and Keokuk, Mo. and Iowa. Upper fish-bed of the *Keokuk limestone*. *XI.*

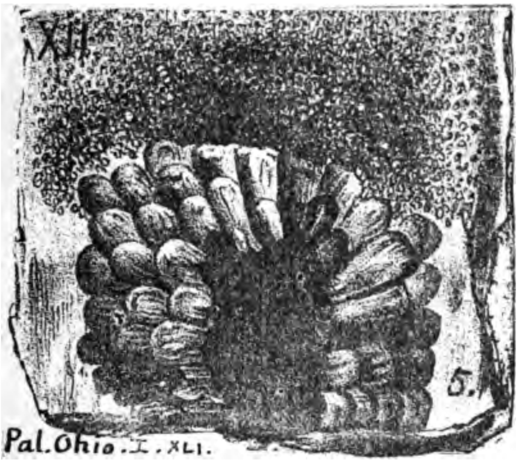


Geol. Ill. Vol. 6. Pl. 11 A. and Vol. 10

(*Polysporia*) **Lepidostrobus mirabilis**, Newberry, Pal Ohio, Vol. 1, 1873, page 362, plate 41, fig. 5, a cone, showing the arrangement of the seed cases (sporangia); 5*a*, a detached sporangium containing microspores; fig. 6, summit of cone surrounded by a mass of spores escaped from the sporangia, and

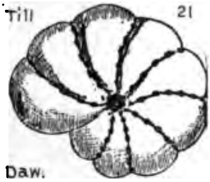
(Lepidostrobus mirabilis continued.)





densely spread over the surface of the stone. Found at Tallmadge, Summit Co. O. in the roof of this coal No. 1, (our *Sharon block coal* near the bottom of the *Pottsville conglomerates*)—*XII.*

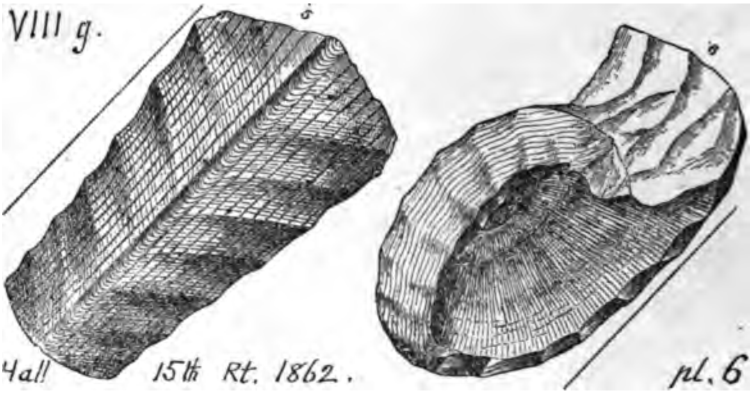
Polystomella striatopunctata, a microscopic organism, Dawson's Acadian Geology, 1868, page 74, fig. 21 *magnified;* found by Dawson in the St. John *glacial clay. Post-tertiary. PP.*



Porambonites obscurus, H. and W. U. S. G. Ex. 40th Par. Vol. IV, 1877.

Porambonites ottawensis, Bill. Pal. Foss. Vol. 1, 1862. *II c.* (See figure in S. A. Miller, 1889.)

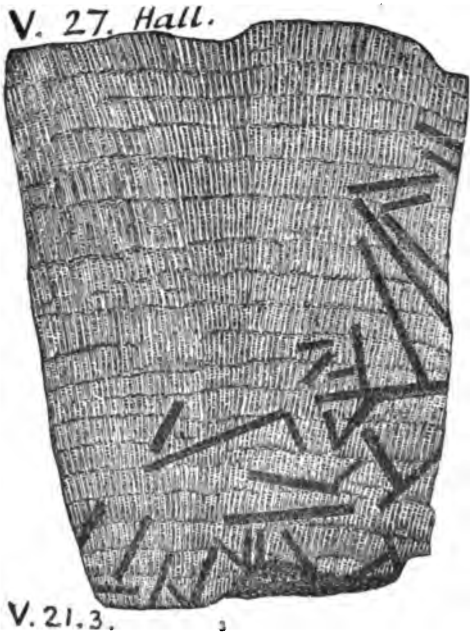
Porcellia ? (*Gyroceras*) nais, Hall. 15th Annual Report, 1862, page 68, plate 6, figs. 5, 6; strongly marked species, different from all others in *VIII;* and it cannot be a *Gyroceras* because it shows no septa.—*Chemung formation, VIII g.*



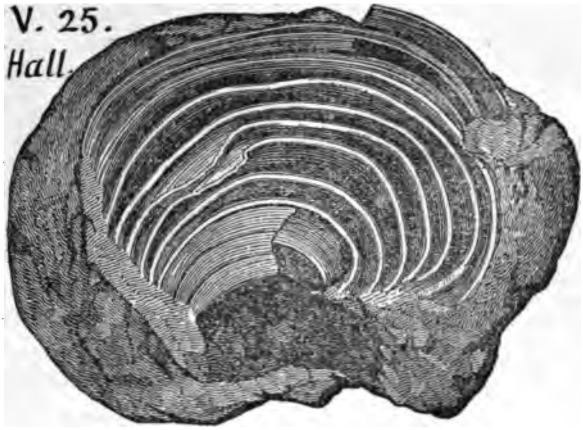
Porcellia crassinoda; hertzeri; nodosa; obliquinodus; peoriensis; rectinoda; and *scioto*, are other species.

Porites, (with cavities left by the dissolution of crystals of selenite (?) Hall. Geology of Western New York, 1843, page 91, fig. 27. *Niagara formation. V b.*

Porites is a genus established by Lamarck in 1816, Hist. des animaux sans vertèbres. It is not an American Palæozoic genus (S. A. Miller).

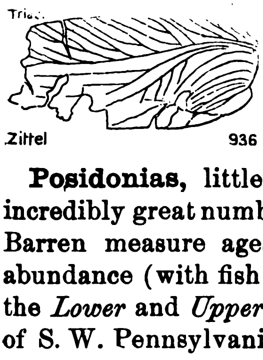

V. 27. Hall.
V. 21.3.

Porites ? Hall's Geology of Western New York, 1843, page 86, fig. 25, shell mostly removed leaving only the lines of growth. *Niagara limestone. Vb.*



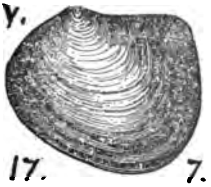
Poroblattina arcuata, Scudder. A cockroach from *Trias*.

Poroblattina lakesii, Scudder. A cockroach from the *Trias*, near Fairplay, Colorado. Proceedings of the Academy of Natural Sciences, Phila., 1885, p. 39. Fig. 936, (*magnified three times*) in Zittel's handbuch.—*Trias*.



Posidonias, little ostracoid lamellibranch shells, lived in incredibly great numbers in the Upper Coal measure and Upper Barren measure ages. See Stevenson's references to their abundance (with fish teeth and scales in the roof shales of both the *Lower* and *Upper Washington coals*, and other higher strata of S. W. Pennsylvania (K 3, p. 306.) Dr. Isaac Lea of Philadelphia, in 1853, Jour. Acad. Nat. Sci. [2] Vol. 2, described three species *P. clathrata*, *P. distans*, *P. perstriata;* and Mr. Gabb, in 1859, Proc. Acad. N. S., Phila., a fourth *P. moorei*, all from the Pennsylvania *coal measures*. *XV*, *XVI*.

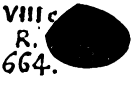
Posidonia ? alata. Hall. Geology of Western New York, 1843, page 72, fig. 17, 7. *Clinton form. Va.*



Posidonia alveata, now **Grammysia.**

Posidonia arcuata, now **Grammysia.**

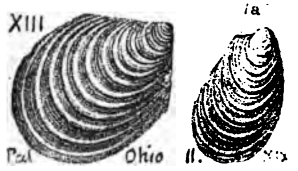
Posidonia lirata, now **Paracyclas.**



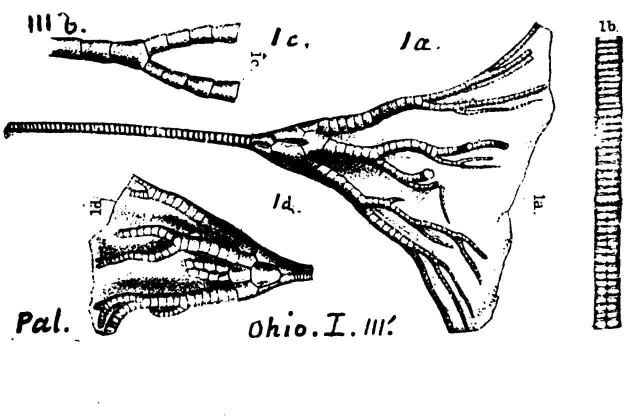
Posidonia ? (Estheria ?) H. D. Rogers' Geology of Pennsylvania, 1858, page 827, fig. 664. *Hamilton formation.* This is possibly Clarke's *Estheria pulex*, Amer. Jour. Sci. [3] Vol. 23, 1882. *Hamilton. VIII c.*

Posidonomya (now **Ambonichya**) *bellistriata.* Owen, 1852, Geol. Wis. etc., p. 2, fig. 19; a cast from the shell beds of strata F. 3. A. at Prairie du Chien. Hall, Pal. N. Y., Vol. 1, 1847. Trenton, H. Riv. and Mid. Silurian.—*II c*, *III b*, and *above.*

Posidonomya fracta, Meek, Pal. Ohio, Vol. 2, 1875, page 333, plate 19, fig. 7*a*, right valve; *b*, left valve (perhaps of another species ?) presenting exactly all the external characters of an oblique *Inoceramus*, fig. 7*a*, being an *exact* miniature of the well known *Cretaceous* shell *I. problematicus*, and therefore a great curiosity. Until the hinge is discovered nothing certain can be known of it. Found in the dark shales of Flint Ridge coal measures in Ohio. Meek thought he had seen imperfect specimens in the Illinois *coal measures. XIII.*

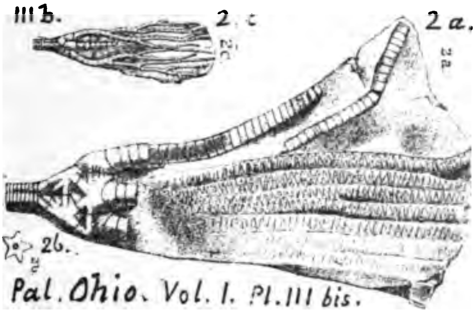


Poteriocrinites **(Dendrocrinus) caduceus**, Hall. Pamph. *Cincinnati group.*—Pal. Ohio, Vol. 1, 1873, page 26, plate 3 *bis*, fig. 1*a*, page 403, diagram *natural size*, side

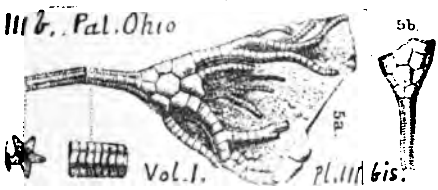


view of body, column and arms (except their slenderer subdivisions); *b*, ×2, part of column; *c*, ×4, subdivisions of arms; *d*, hind view. Of this fine species of coral, Meek had nine examples of the body, etc , for study, all from the typical locality, near Lebanon, O.—*Hudson river formation. III b.*

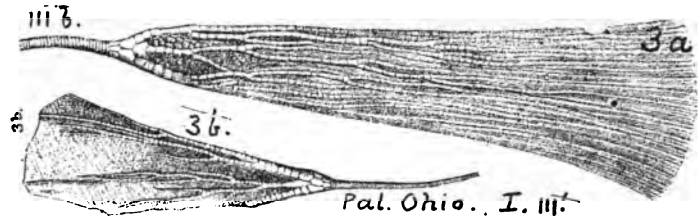
Poteriocrinites **(Dendrocrinus) caseyi,** Meek, Am. Jour. S. & A. [3] Vol. 2, 1871.—Pal. Ohio, Vol. 1, 1873, page 28, plate 3 *bis*, fig. 2*a*, front view of body. The large ventral prolongation is imperfectly seen, like arms above, composed of small pieces marked with little ridges arranged zigzag; 2*b*, end view of pentagonal column; 2*c*, back view of a young specimen. The ventral prolongation is more than five times as long as the body itself (equal the length of the arms), and, as seen flattened, of greater breadth than the body; body resembles that of *Palæocrinus angulatus*, Billings, with differences. Meek says in a foot note that *Palæecrinus* will probably give way to *Cyathocrinites*. *Cincinnati* (*Hudson river*) *formation*, in Ohio and Indiana.—*III bs.*


III b.
2 c
2 a.
2 c
2 a
2b.
Pal. Ohio. Vol. I. Pl. III bis.

Poteriocrinites **(Dendrocrinus) cincinnatiensis,** Meek. Proc. Academy Nat. Sc. Phila., 1872.—Pal. Ohio, Vol. 1, 1873, page 20, plate 3 *bis*, fig. 5 *a*, rear view of body, arms and column; *b*, same of smaller specimen without arms. Close to *P. gracilis*, Hall, (Pal. N. Y. Vol. 1) "found in New York only at the base of the *Trenton;* but *P. cincinnatiensis* is known only from the middle and upper *Cincinnati strata. III b.*

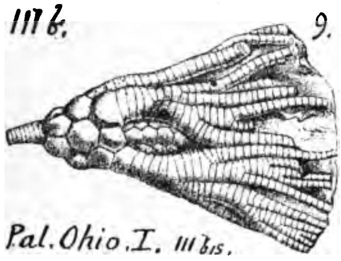


Poteriocrinites **(Dendrocrinus) dyeri,** Meek, Proc. Acad. Nat. Sci. Phila. 1872, *Cincinnati group.* Pal. Ohio, Vol. 1, 1873, page 24, plate 3 *bis*, fig. 3, *a*, *b*, side views of two specimens, the

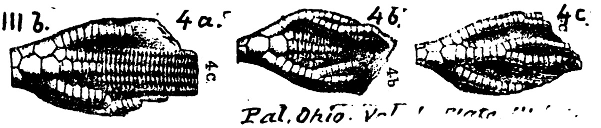

III b.
3 a
3 b.
Pal. Ohio. I. III.

plates of the smaller somewhat deranged by pressure. The little pieces between the rays give it somewhat the appearances of a *Glyptocrinus*. Generally like *D. acutidactylus and gregarius*, Bill. Found at Cincinnati 100 feet below the hill tops. —*Hudson river formation*, *III b*.

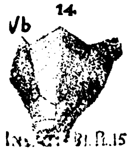
Poteriocrinites **(Dendrocrinus) polydactylus**; *Homocrinus polydactylus*, Shumard. Trans. St. Louis Acad. Sci., 1857, *Cincinnati group.*)—Pal. Ohio, Vol. 1, 1873, page 22, plate 3 *bis*, fig. 9, rear view. Related to *Dendrocrinus jewettii*, Billings, more nearly than to any other. *Cincinnati* (*Hud. river*) beds at Richmond, Ind.—*III b*.

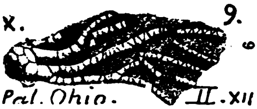

III b.
9.
Pal. Ohio. I. III bis.

Poteriocrinites **(Dendrocrinus) [posticus**, Hall. Pamph. 1866, *Cincin. group.*—Pal. Ohio, Vol. 1, 1873, page 22, plate 3 *bis*. fig. 4*a*, rear view, showing part of the ventral prolongation; 4*b*, rear of another, showing more of the arms; 4*c*, front view of last. Column unknown; surface nearly smooth, or finely granular; species related to *P. polydactylus;* but more nearly to *P. gracilis*, Hall (not McCoy.)—*III b*.

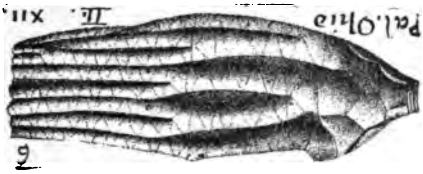


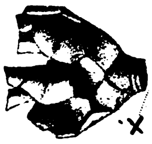
Poteriocrinus? calyx, Hall, Trans. Alb. Inst. X, 1879; also in Collett's Indiana Report of 1881, page 266, plate 15, page 14; a specimen imperfect, but with characteristic unusually long subradial plates. *Niagara*. *V b*.



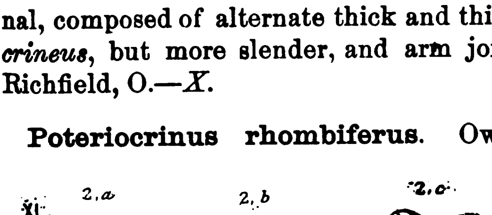


Poteriocrinus corycia, *Scaphiocrinus corycia*, 17th An. Rt. N. Y., 1864, p. 57, Crinoids Wav. sand., Ohio, 1863.) Pal. Ohio, Vol. 2, 1875, page 173, plate 12, fig. 9, *natural size*, original specimen, showing calyx and part of arms; surface somewhat strongly granulose; general aspect of *P. cauliculus* of the *Burlington limestone*, but with different arms. *Waverly shales*, at Richfield, Summit Co. O.—*Pocono formation*, *X*.

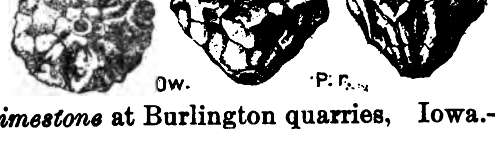




Poteriocrinus crineus, Hall, Crin. Waverly sandstone Ohio, 1863.—Pal. Ohio, Vol. 2, page 172, plate 12, fig. 6, view of the body and arms (to the second forking); 7, opposite side, showing anal plates; surface smooth or finely granulose, without distinct markings. *Waverly shales*, at Richfield, O.—*X*.

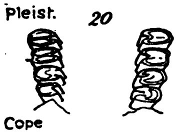


Poteriocrinus pleias, Hall. Crin. Wav. Sand. Ohio, 1863. —Pal. Ohio, Vol. 2, 1875, page 173, plate 12, fig. 8, *enlarged twice*, showing anal side and arms of rear-side rays; column subpentagonal, composed of alternate thick and thin joints; resembles *P. crineus*, but more slender, and arm joints larger. *Waverly*, Richfield, O.—*X*.

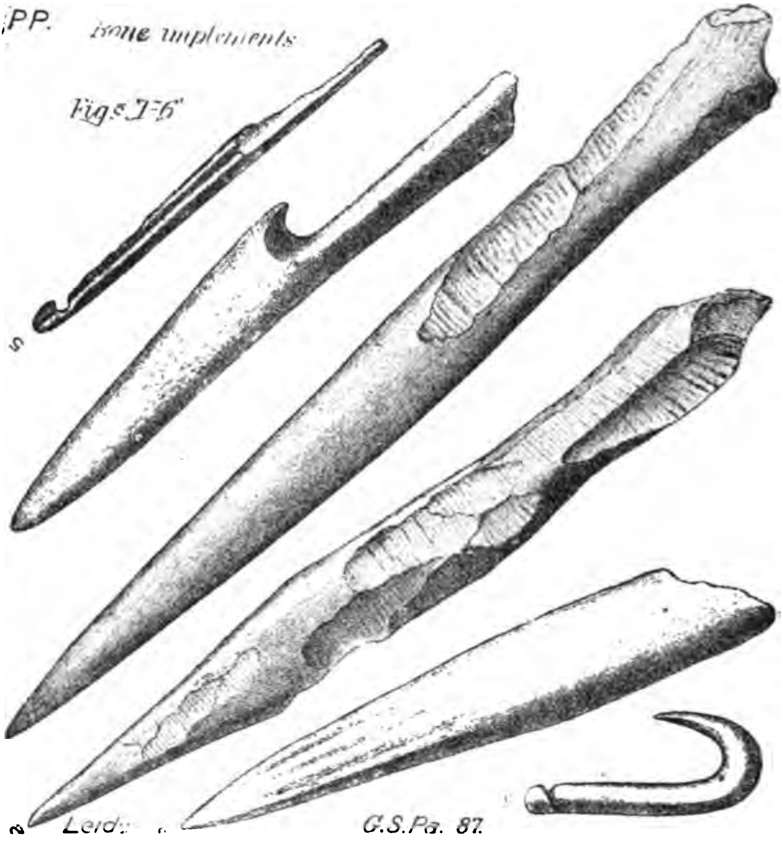


Poteriocrinus rhombiferus. Owen. Geol. of Wisc. Iowa and Minn. 1852, plate 5B, fig. 2 *a*, *b*, *c*, (*b* shows the two accessory plates.) from the *Subcarboniferous limestone* at Burlington quarries, Iowa.—*XI*.

Praotherium palatinum, Cope, Amer. Philos. Soc. Proc. April 7, 1871, Vol. 12, page 94, fig. 20, *natural size*, upper molar teeth of a small rodent, found in the Port Kennedy cave, Chester Co., Pa. *Post-pleiocene?* *PP.*



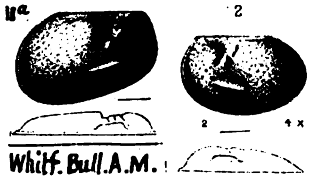
Prehistoric bone implements, found by Leidy in a cave in Lehigh county. Geological Survey of Penna. Annual Report, 1887, page 7, fig. 1 to 3, bone awls manufactured of splinters of the shaft of limb bones of the deer; pointed ends smoothly rounded; figs. 1 and 2 considerably knawed; another with its end knawed into the form of a chisel; fig. 4, a harpoon head made of a deer's antler-prong, with a barb on one side; fig. 5, a bone needle, with a smooth round eye knawed away on one



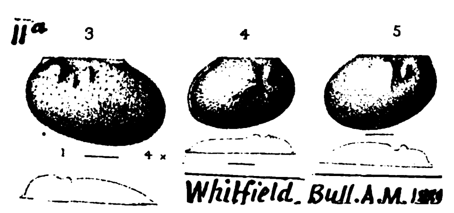
side so as leave it in the condition of a crochet needle; fig. 6, a bone fish hook. With these were found a *Conus ternutus* shell, bored for a bead (a shell belonging to the Pacific coast of Central America, Tryon); also an argillite spear-head, thin, with sharply chipped edges, 8 inches long, 2 inches wide; a fragment of a black hornstone knife: a fragment of brown baked pottery made of clay and broken shells with wicker work marks on the outside; and remains of extinct peccaries, beavers, etc.—*PP.*

Prestwichia danæ. See **Euproops danæ.** *XIII.*

Primitia (*Beyrichia.*) See Ann. and Mag. Nat. Hist. London, [3] Vol. 16, page 417. (G. F. Matthew, St. John, Jan., 1889, correction for *Beyrichia simplex*, Dict. p. 91.)

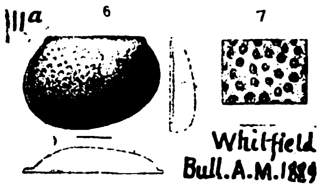


Primitia ? cristata, Whitfield. Bulletin Amer. Musuem Nat. Hist. N. Y. Vol. 2, No. 2, page 59, plate 13, figs. 1, 2, *enlarged four times*, opposite valves, and an outline profile of each, showing elevation. Characteristic feature, the obliquely transverse ridge-like tubercle, very prominent, but often broken off in getting it out of the rock. Somewhat abundant in the black bituminous shales (*Calciferous Sandstone formation?*) on Cave Island, Lake Champlain, with *P. gregaria*, below the lower *Ophileta beds.*—*IIa.*



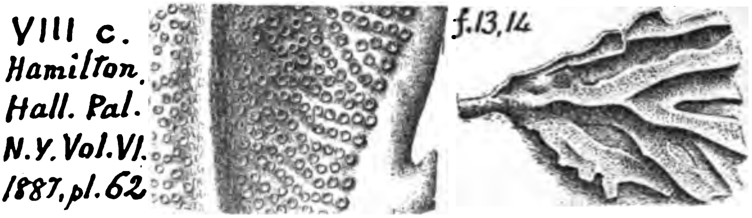
Primitia gregaria, Whitfield. Bulletin, Amer. Mus. N. Y., Vol. 2, No. 2, page 58, plate 13, figs. 3, 4, *enlarged four lengths*, opposite valves, with outline profiles; fig. 5, internal cast of the same. Species somewhat variable in outline, but very variable in number, size and position of tubercles, and in sulcus, which is most distinct in the young. Slabs of black shale of Cave Island, Ball's bay, Vermont, are densely covered with its valves, and those of *P. cristata;* no other fossils; limestones above and below, no fossils. *Calciferous Sandstone formation? IIa?*

Primitia seelyi, Whitfield. Bulletin of Amer. Mus., N. Y., Vol. 2, No. 2, page 60, plate 13, fig. 6, *enlarged four times,* right valves with profiles; fig. 7, *magnified* crust, showing the pits with granules in them. A dark blue layer of crystalline limestone, at Shoreham, Vt., and water worn fragments of granular limestone from Providence Island, Lake Champlain, are largely composed of them. Perhaps the same as the Fort Cassin rocks (Seeley.)—*Calcif. SS.? II a?*

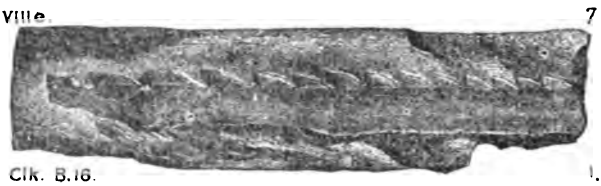


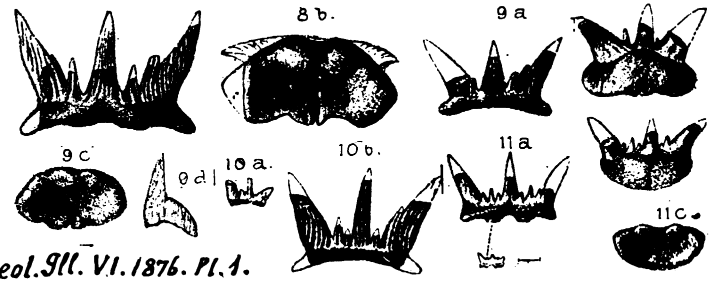
Other species are *P. acadica; æqualis; cincinnatiensis; concinna; logani; leperditioides; mundula; muta; reniformis; rugulifera; scaphoides;* and *sigillata.* See S. A. Miller's Geo. and Pal. of N. A. 1890.

Prismopora dilatata, Hall, Trans. Alb. Inst., 1881; State Rt. for 1883; Pal. N. Y., Vol. 6, 1887, page 265, plate 62, fig. 13, *nat. size,* a fragment; 14, *enlarged six times.* Madison Co., N. Y. *Hamilton. VIII c.*



Pristacanthus vetustus, a most remarkable and most ancient *fish spine,* figured of *natural size* by Clarke in Bull. No. 16, U. S. Geol. Sur. 1885, page 42, plate 1, fig. 7, a fragment, with 14 notches, points backward; exceedingly thin, smooth, almost flat, granulated; a unique example; the earliest known fossil specimen of this genus; from the *Naples* (*Upper Genesee*) *black shales* in the Sparta RR. cut, which have yielded many other undetermined fish scales and plates.—*VIII é.*

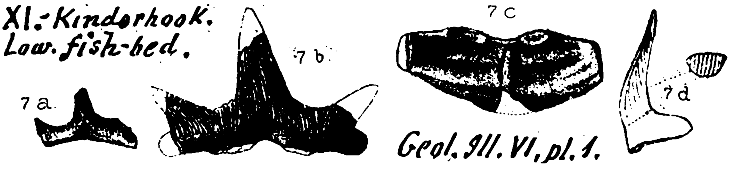




XI

Geol. Ill. VI. 1876. Pl. 1.

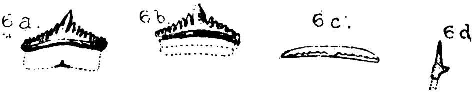
Pristicladodus armatus (a variety of springeri), St. John & Worthen, Geol. Ill. Vol. 6, 1875, page 256, plate 1, figs. 8*a*, *enlarged 8 times*, large tooth, outer face ; *b*, lower basal surface with worn protuberances in front, and middle foramen in back margin ; 9 *a*, *enlarged 2*, similar tooth, front ; *b*, back ; *c*, base ; *d*, profile ; 10 *a*, small tooth, outline ; *b*, *enlarged*, front ; 11*a*, *enlarged*, minute tooth, front view ; *b* back face ; *c*, base. All from *Subcarboniferous Kinderhook upper and lower fish beds. XI.*



XI.: Kinderhook. Low. fish-bed.

Geol. Ill. VI, pl. 1.

Pristicladodus springeri, St. John & Worthen, Geol. Ill. VI, p. 255, pl. 1, figs. 7*a*, outline *b*, *enlarged* outer face ; *c*, lower basal surface ; profile and section of cone. *Lower fishbed* at Kinderhook, *Subcarboniferous limestone. XI.*

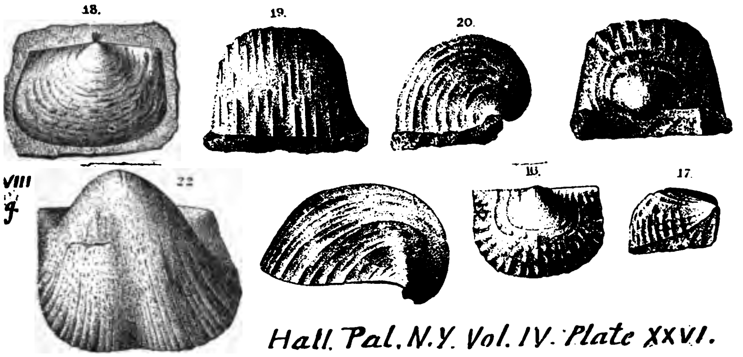


XI. Kinderhook. Geol. Illinois. VI. page 402, pl X A.

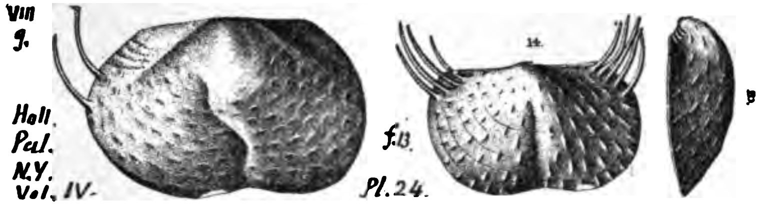
Pristodus? acuminatus, St. John & Worthen, Geo. Sur. Ill., Vol. 6, 1875, page 402, plate 10*a*, figs. 6*a*, *b*, *c*, *d*, views of a unique specimen of a delicate little fish tooth with features indicating a closer relationship to Agassiz' genus *Pristodus* than any other American *carboniferous* specimens do, (Comp. *P. falcatus*, Ag.) Lower fish bed, *Kinderhook. XI.*

Prodryas persephone, Scudder. A butterfly from the *Oligocene tertiary beds* of Florissant, Colorado, admirably preserved in the old lake mud, as shown by Zittel's figure 1092 (*natural size*). Handbuch derPalæontologie. —*Tert.*

Productella arctirostrata (*Productus arctirostratus* Hall. 10th Regent's Rt. 1857. *Chemung.*) Hall. Pal. N. Y. Vol. 4, 1867, p. 182, plate 26, fig. 19 to 21, ordinary form of ventral casts in sandstone; 16, 17, dorsal interior and cast; 22, 23, ventral valve and profile, large and rather extravagant form. Resembles some extreme examples of *P. shumardiana* of the *Hamilton* of the west, but it is a larger and stronger shell and marked by concentric wrinkles. *Chemung rocks* at Jasper, Steuben Co., N. Y., and south of Cadiz. *VIII g.* Distinguished by its narrow beak.—In Pennsylvania, Tioga county, Covington borough, collected by A. Sherwood, 1875, in specimen 852–1 (see Hall's Pal. N. Y. Vol. 4, pl. 26, fig. 22, 23; with sinus much less distinct than in 855–11 (G. B. S.) Charleston township, sp. 854–3 (six casts, some fairly good), 854–11 (one cast showing nodes, another entirely smooth showing muscular scars), 854–42, 46 (see Hall's fig. 22); Sullivan township, sp. 855–14; Mixtown, sp. 856–22 (Hall's figure 22), 26 *a*, 29–40 *c*; Mansfield, spec. 860–21, 44 *a* (good example, identified by J. Hall, Nov., 1888); Sullivan township, spec. 861–30 (large narrow form); all from the *Upper Chemung. VIII g.*



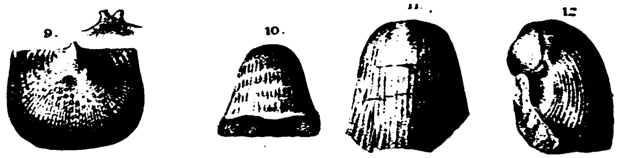
Hall. Pal. N.Y. Vol. IV. Plate XXVI.

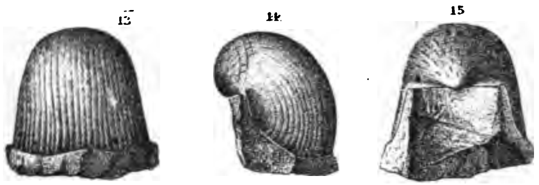


Productella boydii. *Productus boydii*, Hall. 10th Regents' Rt. 1857, *Chemung.*—In Pennsylvania, Warren Co., collected by Randall, in Tioga Co. by Sherwood; both from *Upper Chemung strata;* in Crawford Co. by I. C. White, from *under Cussewago sandstone*, where it abounds (Q4, p. 97); in the *First Oil Sand* (p. 102, 198); scattered through the shales *under the Second Oil Sand*, both in Erie and Crawford Cos. (p. 104); becomes abundant at 325′ of White's Chemung section of Erie Co. ascending from the non-fossiliferous lower subdivision (p. 118); in *Cussewago sandstone* at the Meadville iron bridge, with other Chemung shells (p. 165); fills the flagstones in the bed of Mill run at the Meadville oil well. A fine specimen from here was got by Carll (p. 171). Hundreds in the blue shale under the *Cussewago sandstone* at canal feeder dam in Hayfield, Crawford Co.—Sherwood's Tioga county collections contain spec. 855–11 (doubtfully identified; has a very distinct sinus; not figured in Pal. N. Y.; G. B. S.) 855–12, (ditto; convex; nodes few, elongated, sharp) 855–14 *a* (ditto; very convex, stronger sinus than any figured specimens), 855–20 (ditto), 855–31 (ditto), 855–36 *a* (distinctly eared, with ridge along middle of cast), 855–37 (ditto; convex; deep sinus; pustules becoming lengthened at the front), 855–38 (identified by J. Hall, Nov., 1888), 855–42 (ditto), all from Sullivan township; 855–51 (ditto, with *Strept. chemungensis);* 850–30, from Mixtown; 860–49, 63,–64 *a* (all three doubtful), 860–72 *b* (ident. J. Hall), 860–73, near Mansfield; 861–2 (J. H.), 861–7 (J. H.), 861–16 one specimen *with very long spines*, nearly an inch long), 861–23 (two large specimens), 861–26 (?), 861–29 (?, with long spines), all in Sullivan township; and all Sherwood's specimens from *Chemung upper beds.*—872–46 *a* (?, nodes arranged in concentric lines, *the only specimen in the collections with that arrangement*) came from Nicholls, Tioga Co., N. Y. *Chemung beds*, Spec. 884–4 (two dorsal valves) came from Lycoming Co. west line of Anthony township, bet. Marshall's and Stabler's. *Chemung. VIII g.*

Productella costatula, Hall. Pal. N. Y. Vol. 4, 1867, page 180, plate 26, figs. 9 to 15. Characterized by small ribs. The dorsal valves, interior surface alone known, are deeply concaved. Inner surface strongly papillose-striate and shows concentric striæ. Species somewhat like *P. dumosa*, of the *Hamilton* rocks. Dorsal valve like *P. striatula*, but can be distinguished by its numerous minute pustules inside. Many places in New York in *Chemung formation*.—In Pennsylvania collected by Carll & Randall at Warren (C. E. Hall's MS. Rt. 1876), from *Upper Chemung strata*. *VIII g.*

VIII g. Chemung formn.

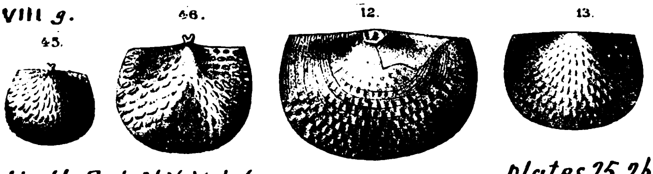




Hall. Pal. N.Y. Vol. IV p. 180 plate 26.

Productella exanthemata (*Productus exanthematus*, Hall. 10th Regents' Report 1857). *Hamilton.* Apparently covered with pustulous eruptions.—Hall. Pal. N. Y. Vol. 4, 1867, page 163, plate 23, figs. 45, 46, interiors of dorsal valves, *natural size;* plate 25, figs. 12, 13, interiors of dorsal valves; differing all from interiors of *P. shumardiana;* and from similar shells from the *Corniferous;* but all may turn out to be varieties of one species. From *Hamilton beds* on Seneca

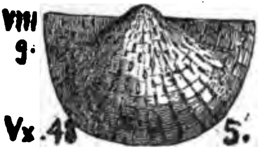
VIII g.

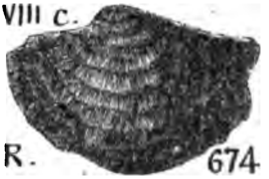


Hall. Pal. N.Y. Vol. 4. plates 25, 26

lake, N. Y.—In Pennsylvania collections: Spec. 854–4 (like Hall's figure, but larger, cast in fair condition), 854–5 (poor casts), from Charlestown, Tioga county; spec. 855–10 (pustules or nodes nearly obsolete), 855–14 *b* (obscure), 855–18 (?), 855–33 (? perhaps *speciosa*), from Sullivan township; spec. 856–36 (?) from Mixtown; spec. 868–2 (probably; cast, fair); spec. 860–25, from Mansfield; spec. 861–5, from Sullivan township; all from *Chemung upper beds. VIII g.*

Productella hirsuta, Hall, 15th Regent's Rt. 1857. (*Productus hirsutus*, Vanuxen's Geol. 3d Dist. N. Y., 1843, p. 179, figs. 48, 45; H. D. Rogers, Geol. Penna. 1858, page 828, fig. 674. *Chemung.*)— *P. hirsuta*, var. *rectispina*, Hall. Pal. N. Y. Vol. 4, 1867.— In Pennsylvania, Erie Co. very abundant in White's *upper Chemung beds* (above the non-fossiliferous lower division), Q4, p. 118. At Warren, Randall's specimens 9489, 9490, 9491. At Tioga, recognized by J. Hall in Sherwood's specimen 853–8. At Linden, Lycoming county, spec. 891–1 *b*, 891–3 *a*, 891–4, all from the *iron ore beds* at the *top of the Chemung.* In Columbia Co. White's Section 13, bed 30; Sect. 78, bed 39; at Danville; and Fidler cr. Sect. beds 12, 16, 25, 28 (G7, pp. 99, 286, 307, 367) all in *Chemung.* Also the variety *rectispina* at Danville (G7, p. 72, 308, 307). In Perry Co. Claypole's Spec. 27–11 (box full) from opposite Newport; 37–2,–3, 2½ m. N. of Liverpool; 39–1 (five) Middle ridge; 53–3, 6,–2, Carlisle road; 57–32, Junkin's farm; 109–3–4, N. of Delville; 115–3, New Bark tavern; 129–6, mouth of Lock's run; 141–2, Pine Grove; all from *Chemung.*—The Columbia county (White's) collections are in Claypole's Cat. (in OOO) Spec. 68–20, from opposite Bloomsburg; 80–1 (thirty), 80–2, 80–7, from RR. cuts east of Asylum, from *low Catskill beds;* 97–4,–19 from Stony Brook near Bloomsburg. Specimen 80–3, Asylum, was pronounced by J. Hall to be his variety *rectispina.* In Huntingdon county, it is very abundant in White's S. bank Juniata Section (bed 8) at 230′ beneath the *Allegrippus conglomerate* (*Chemung lower*

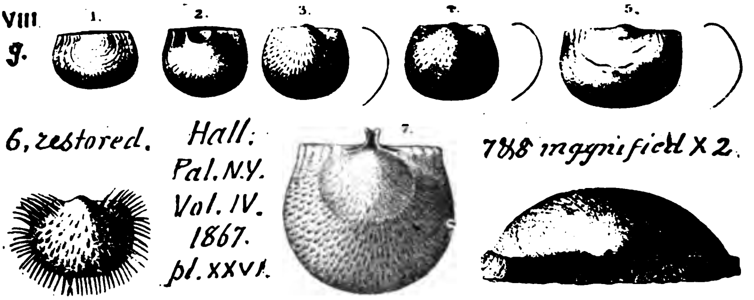




conglomerate of Stevenson) or 1100′ beneath the *Lackawaxen* (*Chemung upper*) *conglomerate.* The same species (?) appears also in the Haun's bridge section, at 450′, and at 300′ beneath *upper conglomerate*, that is, nearly top of, *Chemung*. *VIII g.*

Productella hystricula, Hall. Pal. N. Y. Vol. 4, 1867,

VIII g.



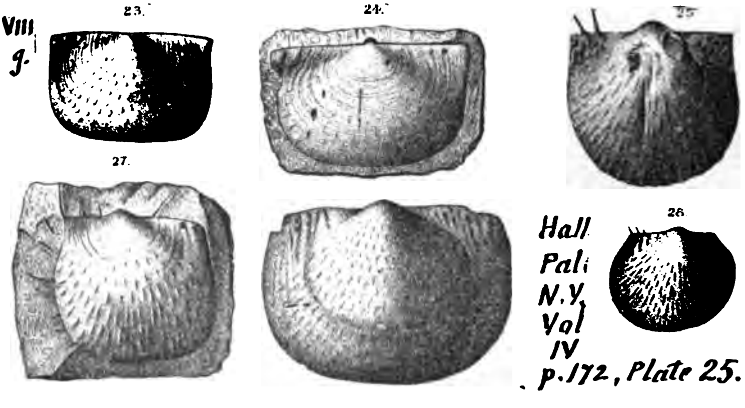
6, restored. Hall: Pal. N.Y. Vol. IV. 1867. pl. XXVI.

7 & 8 magnified X 2.

page 178, plate 26, fig. 1, 2, impressions of dorsal valves; 3, 4, 5, casts of ventral valves; 6, a *restored specimen, showing the spines as preserved in impressions in the sandstone;* 7, *enlarged* twice, dorsal interior to show hinge process and small dental sockets; 8, *enlarged* twice, hinge view of ventral cast, showing narrow area and bilobed apex. These shells occur in great numbers, the spines being commonly of the proportional size shown in fig. 6, in a hard sandstone at Forestville, Chautauque Co., in friable sandstone at Conewago, and in limy layers at E. Randolph, Cattaraugus Co., N. Y.—It has not been reported in Pennsylvania.—*Chemung. VIII g.*

Productella lachrymosa (*Strophomena lachrymosa*, Con-

VIII g.

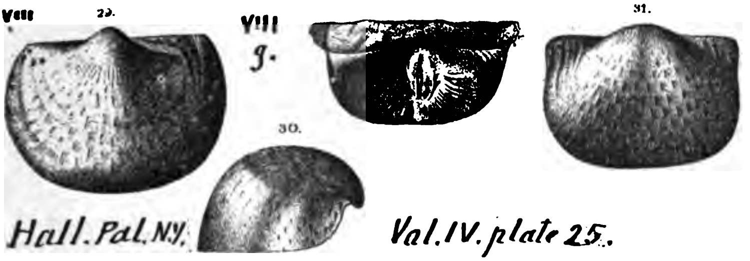


Hall Pal. N.Y. Vol IV p.172, Plate 25.

rad, Jour. Acad. Nat. Sci. Phila. Vol. 8, 1842, *Chemung.*) Hall. Pal. N. Y. Vol. 4, p. 172, pl. 25, figs. 23 to 28.—In Pennsylvania collections: Spec. 807–11 (identified by J. Hall, Nov., 1888). Marshall's creek, Monroe county, in *Hamilton;* (*?*) Spec. 852–2 (half a valve seen), Covington, Tioga county, in *Upper Chemung;* and in the county, Covington, Spec. 854–23 (cast, strong pustules), 854–43 (casts showing pustules, several specimens showing both valves). 854–44 (three; casts varying in form, showing pustules,) *ditto.* In Sullivan township Spec. 855–21,–41 (Hall's figures), 855–48,–55; also at Mixtown, Spec. 856–26(?), 856–34, 856–40 *b;* also at Mansfield, Spec. 858–1 (var. *lima*, See Hall, Pal. N. Y. Vol. 4, plate 25, fig. 31), 858–10; Spec. 860–35 (?), 860–55; also in Sullivan, Spec. 861–1 (?), 861–3 (probably), 861–34; and one Spec. 872–12 (obscure, probable,) from Nicholas in Tioga county, N. Y.—In Bradford Co., west of Leroy, were got Claypole's specimens 69–2,–9, (fifteen in all) from *Chemung beds.*—In Columbia county, Rupert section, bed 38 (G7, p. 69, 287), and Bloomsburg section, bed 6 (G7, 290), *Chemung.*—In Perry county, 5 m. S. of New Bloomfield, Spec. 57–47, from *Chemung-Catskill. VIII–IX.*

In Erie county, abundant in White's upper subdivision of of *Chemung* (Q4, p. 118.)—Recognized by C. E. Hall in Carll's collections; See Cat. O, spec. 3278, in grey SS. from Dennis run, ½ m. E. of Triumph, Warren Co.—Also, variety *stigmata*, recognized by C. E. Hall in both Carll's and Sherwood's collections of 1875, in *Upper Chemung. VIII g.*

Productella lachrymosa, var. **lima**. Hall, Pal. N. Y.,

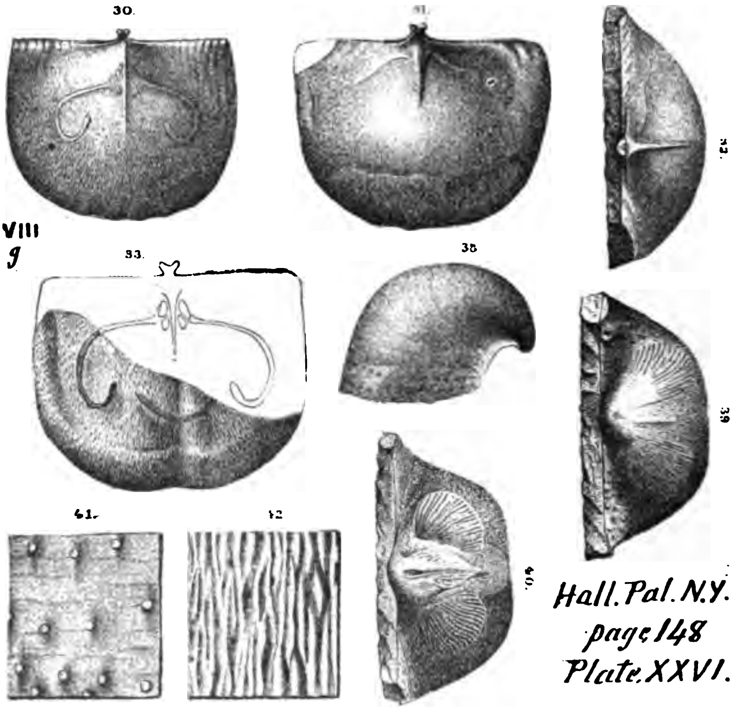


page 174, vol. 4, plate 25, figs. 29 to 32.—Collected by Sherwood at Mansfield, Tioga Co. Pa., a mile north of the village, Spec. 858–1. *Upper Chemung*, *VIII g.* —This is Conrad's

Strophomena lima, Jour. Ac. Nat. Sci. Phil. Vol. 8, p. 256; associated with *P. lachrymosa*, and passing into it by variations of form; approaches *P. boydii*, by being distinctly depressed in the middle, the dorsal valves being correspondingly elevated, leaving a depression in interior casts, which are often the only remains to be found in the rock; but differs in the ventral valve being more gibbous, in a depression broader and shallower, and in the characteristics spiniferous tubercles. Various places in western New York. (Hall.)—*Chemuny. VIII g.*

Productella onusta, Hall. Pal. N. Y., Vol. 4, 1867, page

VIII
g

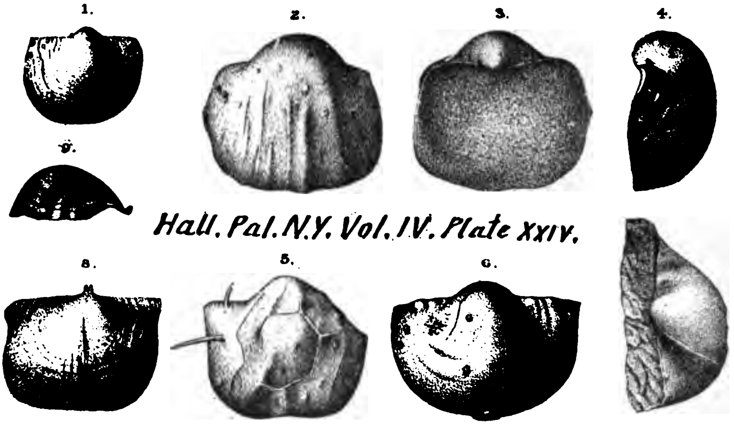


Hall. Pal. N.Y.
page 148
Plate XXVI.

184, plate 26, figs. 29 to 42, from which I select a number.—*Chemung.*—In Erie Co. Pa., collected by I. C. White at Le Boeuff's quarry. one mile from Le Boeuff RR. station, Spec. 869–17 *b* (cast.) from *Panama conglomerate.* Also at Warren, Spec. 9485 of Randall's collection, from *Upper Chemung. VIII g.* —Hall says this shell is very symmetrical and the largest among the species of this subgenus, readily distinguished from all others by its regular wide form and equal convexity, as well as by its distantly disposed and very slender spines, by the peculiar punctate structure of the exfoliated shell, and the striato-punctate surface of the cast. The form and character of well-preserved specimens are shown in figs. 36, 37, and 38, which give the outline, cardinal and profile views of a ventral valve. Figs. 39 and 40 are hinge views of ventral casts, with muscular impressions, and one of them showing cavities on each side of the beak made by the dental lamellæ. Figs. 30, 31 are dorsal interiors; 32, a hinge view.—In the sandy and limey *Chemung beds* at Conewango, Napoli, and New Albion, Cattaraugus Co., N. Y.—*VIII g.*

Productella pertenuis. (*Productus pertenuis.* Meek Pal. East Nebraska, 1872, *Coal measures.*)—In Pennsylvania identified by C. E. Hall in Spec. O 1-6 (OOO, p. 253) of Congruity, Westmoreland, from *Barren measures.* *XIV.*

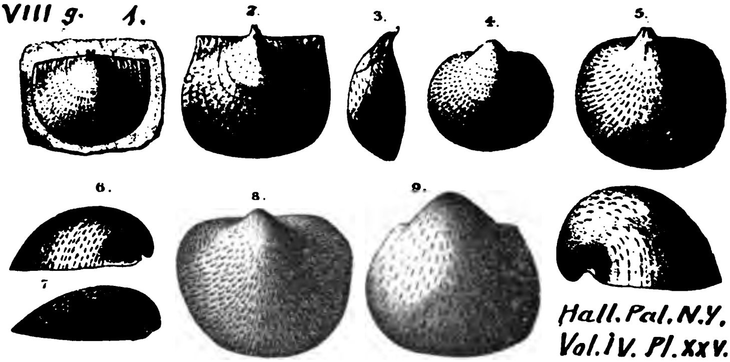
Productella rarispina, (*Productus rarispinus.* Hall, 10th Regents Rt. 1857. *Chemung.*) Hall, Pal. N. Y. Vol. IV, 1867, page 170, plate 24, figs. 1 to 9. It occurs in the same beds with *P. boydii* and *P. hirsuta*, but is easily distinguished from them by its greater gibbosity and fewer spines; and its casts, by extremely fine papillæ and their extension in hairlike striæ. In general characters it resembles *P. subalata* of the *Hamilton formation*, in Illinois. Found in the *Chemung beds* at Phillipsburg, Alleghany Co., N. Y., and on Tioga river.—In Pennsyl-



Hall. Pal. N.Y. Vol. IV. Plate XXIV.

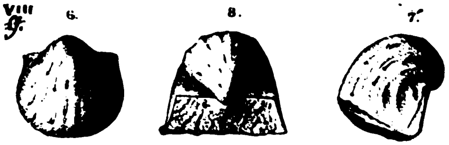
vania, Lycoming Co. Linden, found by Sherwood in the *iron ore bed* at the *top of the Chemung*. Specimens 891–1c, 891–7, (OOO, p. 249).—*VIII g.*

Productella speciosa, (*Productus speciosus*, Hall. 10th Regent's Rept. 1857, *Chemung.*) Hall, Pal., N. Y., Vol. 4, page 175, plate 25, figs. 1 to 10. Resembles *P. lachrymosa*, but the spine-bearing tubercles are smaller, nearer together and more numerous, and the ventral beak is narrower, and more abruptly sharpened; dorsal valve inside studded with tubercles; etc. (See Hall's text.) It has been found in the *Chemung* of Chautauqua, Cattaraugus and Alleghany Co., N. Y.—In Pennsylvania, Tioga county, one mile north of Mansfield, Sherwood's spec. 858–2 contains it and *P. exanthemata*. *Upper Chemung.*—C. E. Hall reports it in Carll's collections from the same horizon in the Oil field. *VIII g.*



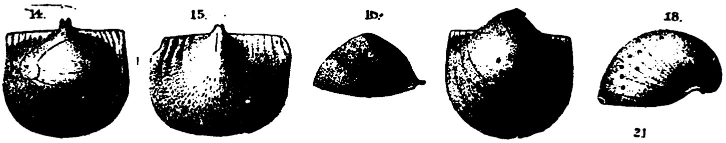
Hall. Pal. N.Y. Vol. IV. Pl. XXV.

Productella spinulicosta. (*Productus spinulicostus*. Hall, 1857,10th Ann.Rt.) Possibly the same as *P. shumardiana* of Iowa, Hall, Pal. N. Y., page 160, plate 23, figs. 6, 7, 8. Found in the limy beds of *Marcellus shale*, and in *Hamilton shales*, on the shores of Lake Erie, Cayuga and Seneca lakes, N. Y.—In Pennsylvania, Perry county, Barnett's mill, Claypole's spec. 5–120 (six); and Dorran's narrows, spec. 118–25 (two); from *Hamilton upper shale*. *VIII c.*



Hall. Pal. N.Y. Vol. IV. p. 160. plate 23

Productella striatula, Hall, Pal. N. Y., Vol. 4, 1867, page



Hall.
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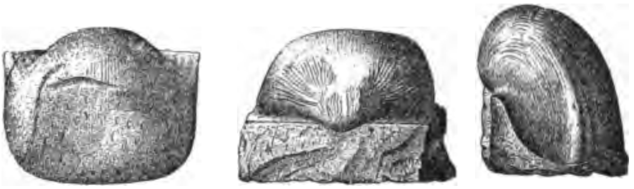
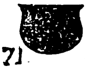
Vol.IV
p.177.
Pl.XXV.



148, 177, plate 25, figs. 14 to 21. *Chemung.* For the internal difference between this and *P. onusta*, see the wood cuts on page 148 given by Hall in his discussion of the genera *Productus* and *Strophalosia.* He calls *P. striatula* a neat and well marked species, more delicate than *P. rarispina*, and with slender spines; shell thin and easily exfoliated, exposing then a finely striated surface beneath. Found in some limy beds of *Chemung* in western New York.—In Pennsylvania recognized by C. E. Hall in Carll's and Randall's collection at Warren, and Sherwood's in Tioga county; *Chemung upper strata. VIII g.*

VIII b



71 4.

Productella truncata. (*Proauctus truncatus; Strophomena pustulosa*), Hall, Geology of Fourth District, N. Y., 1843, page 180, fig. 71, 4. *Marcellus.* In Pennsylvania, Perry county, Barnett's mill, Claypole's specimen 5–106 (two), from *Hamilton upper shale. VIII b, c.*

Productella ——? 855–52; 856–27, –32, –38; 858–14; 859–8; 860–21, 72 (slab covered with poor specimens), –89; 861–1 (large, comparatively narrow), –2 (three large ones), –7 (large, with long spines, like the last), –17, 21 *c* (several casts), –28 *c* (poor), –30 (large narrow form, like 861–1), –38; 867–1 (poor); 870–22 (poor); 872–27 (obscure); 881–4; 883–53, –64 *d* (very poor), –77; 884–1 (nine blocks, with many examples; also *Rhynchonellas*), 884–2 (five), 884–3 (seven), 884–4 (two, flat forms); 891–1 B (large, slightly convex, with ridge along the inside), 891–1 *c* (small, convex), 891–3, –4 (flat, needle ridge), –5, –7 (small, gibbous). All from *Chemung. VIII g.*

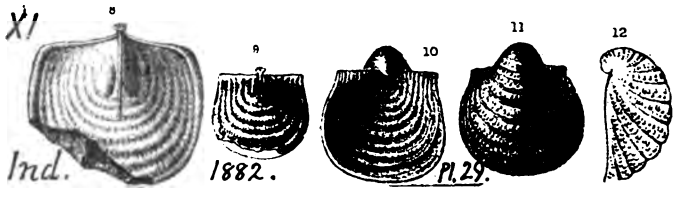
Productella —— ? in I. C. White's *Stony Brook beds* (passage of *Chemung* into *Catskill*) at Rupert, bed 9 (G7, p. 68, 72, 216, 227); at Catawissa, bed 98 (p. 240), bed 37 (p. 197); in Mifflin township, Columbia Co. (p. 277); in Shamokin township, Northumberland Co. (p. 365); in Jackson township (p. 365). *VIII–IX.*

Productella —— ? Among *Streptorhynchus chemungensis*, *Spirifera disjuncta*, etc, sparingly distributed through the 1850′ or less interval between *Hamilton* and *Catskill* in Monroe and Pike Cos., Pa. G6, p. 105. *VIII g.*

Productella —— ? in Huntingdon Co. Shy Beaver section, lowest 75′ of 300′ sandy beds under *Allegrippus conglomerate* (T3, 163); also in Haun's bridge section, beds 6 and 7 (p. 194); also in Pa. RR. section at Huntingdon, blue-gray shale bed 55 (p. 264). In Bedford Co. Saxton section, bed 30, 100′ under *Allegrippus* (*Chemung lower*) *conglomerate* (T2, pp. 79, 230); also near Union township line, in *Chemung flags* (p. 133.) In Warren county under the *Olean conglomerate*, *XII;* and at Johnson's sawmill (IIII, p. 32, 255.) In Venango Co., Benedict farm, near Pleasantville, Spec. 3277 (O, p. 146) in *X.* In Crawford Co., near Spartanburg, with *Strophodonta*, on spec. 3258 (O, p. 146); spec. 3263, 2 miles N. of Titusville; both in *X.* In Erie Co. characteristic of the *Third Oil Sand* (*Leboeuff*, *Panama conglomerate*) Q4, pp. 110 249. *Chemung. VIII g*, and *X.*

Productus. A large number of species have been made of this genus, many on superficial grounds. Considering the large vertical range in time of some, and the wide geographical range of others, Mr. Keyes is justified in pronouncing the present group as in an extremely unsatisfactory condition. (See Proc. Acad. Nat. Sci. Phila., March–Sept., 1888, page 228).

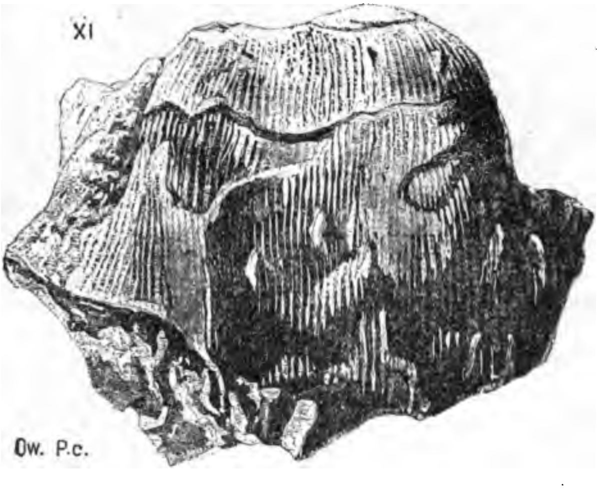
Productus biseriatus. (Hall, Trans. Ill. Inst. Vol. 4, 1856.



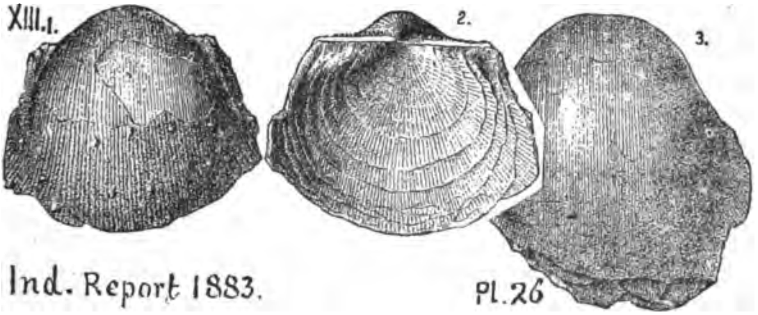
Whitfield Bull. 3. Am. Mus. plate 6, figs. 8–12.) Collett's Indiana Rt. 1882, page 325, plate 29, fig. 8, *enlarged twice*, inside surface of dorsal valve from Ind.; fig. 9, *natural size*, another spec. from Ill.; figs. 10, 11, 12, a large specimen from Spergen Hill, Ind. *Subcarboniferous limestone. XI.*

Productus cestriensis, Worthen, Trans. St. Louis Acad. Sci. 1860, *Chester limestone* of Missouri. (*Productus elegans*, Norwood and Pratten, 1854, name pre-occupied.)—In Pennsylvania, Fayette Co., Loyalhanna gap, found by Stevenson (K2, p. 291, K3, p. 311) in the *Mauch Chunk red shale limestone. XI.*

Productus cora. Owen's Geol. Wis. 1852, plate 5, fig. 1, from the Missouri river, below Little Platte river. *XI.*



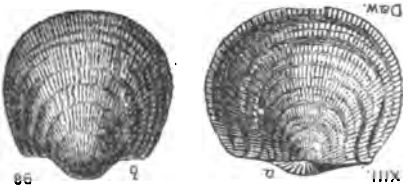
Productus cora. (*Productus prattenianus*, Norwood &



others.) Collett's Indiana Report of 1883, page 126, plate 26, figs. 1, 2, *natural size*, ordinary example; fig. 3, ventral view of another example showing finer radiating lines and the *absence of spines* on the general surface. Owen and Marcou referred the shell of our western States to D'Orbigney's South American form correctly, in Collett's opinion, after examining Dr. Darby's more recent specimens. Shells sometimes large.—*XIII.* Sometimes occurs in Lower Carboniferious strata also. Collett.—Stevenson found it in the *Crinoidal limestone* of the Barren measures on the Monongahela river, Pa. Report K, page 80. *XIV.*—Heilprin found the upper half of a large valve, and also a nearly perfect round ventral valve of this in the Wyoming Hist. Soc. collection of anthracite fossils near Wilkes-Barre, Pa., from the *Mill creek limestone*, which lies 1000 feet above the Pottsville conglomerate, and probably corresponds to the *Great limestone* of the Monongahela region. See Geol. Sur. Pa. An. Rt. 1885, page 440, 452, figs. 1, 1A.—*XIV? XV?*

1 PRODUCTUS CORA.

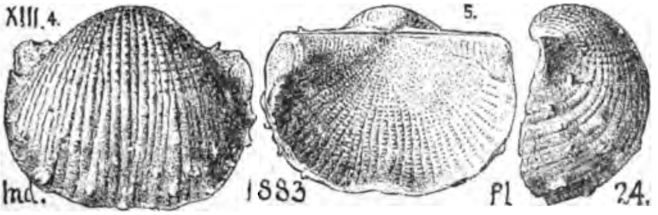
Productus cora, d'Orbigny. Dawson's Acadian Geology, 1868, page 297, fig. 98 *a*, dorsal, *b* ventral valve, is identical with *P. conoides* and *P. scoticus*, De Kon. (not of Sow.), *P. corrugata*, McCoy, of Ireland, *P. lyelli*, DeVer., *P. tenuistriata* and *P. neffedievi*, DeVer. of Russia, *P. pilei*

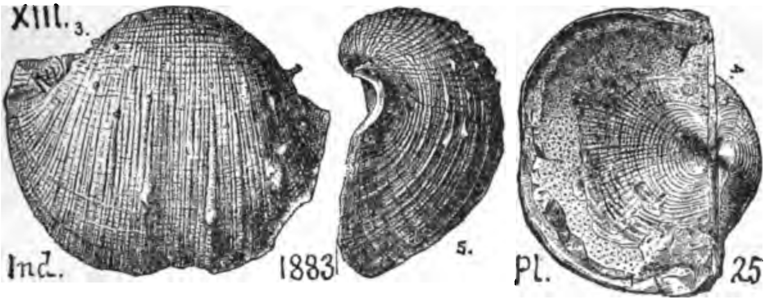


formis, McChesney, in the western U. S., *P. lyelli*, Dawson, in the Nova Scotia *Lower carboniferous limestones.* (Davidson in Dawson's Acad. Geol.) This shell is found in South America and in India.—*XI?*

P. cora var. **pileatus**, McChesney, recognized by J. J. Stevenson in the *Coal measures* of S. W. Pennsylvania, K3, p. 3111.—*XIII.*

Productus costatus. Sowerby's English species, which in America ranges through the coal measures from bottom to top in the western States and Rocky mountains. Similar to, but smaller and more coarsely ribbed than *Productus semireticulatus.* *XIII.* Collett's Indiana Report of 1883, page 124, plate 24, figs. 4, 5, 6, *natural* and *common size ;* plate 25, figs. 3, 4, 5, *natural size* of a large specimen. In Pennsylvania, in the *Crinoidal L. Barren measures*, of Fayette Co. (L, p. 35); and *Ferriferous L.* Beaver Co. (Q. p. 200.)—*XIII, XIV.*





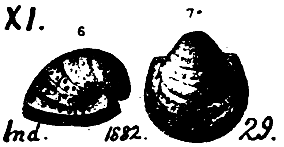
Productus depressus. See **Strophomena depressa.** V *b.*

Productus elegans, Norward and Pratten, name preoccupied. See **P. cestriensis.** *XI.*

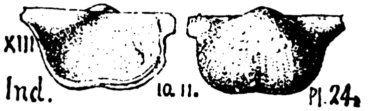
Productus flemingi, Sowerby. Min. Conch. Vol. 1, 1814, *Lower carboniferous.*—Var. **burlingtonensis,** Hall, Iowa report, 1858, *Burlington limestone. XI.*—Recognized by C. E. Hall (MS. Rept. Dec. 30, 1876) in Hon. J. F. Mansfield's collections at Cannellton, Beaver Co., Pa.—*XIII?*

Productus hirsutus. See **Productella hirsuta.** *VIII g.*

Productus indianensis. (Hall. Trans. Alb. Inst. Vol. 4, 1856. Whitfield, Bull. 3, Amer. Mus. Nat. Hist., N. Y. 1882, plate 6, figs. 6, 7, *enlarged* twice, largest type specimen. Resembles Murchison's English *Productus subaculeatus*, but narrower, etc., and spine-bases much smaller.) Collett's Ind. Rt. 1882, page 326, plate 29, figs. 6, 7. Spergen Hill, Ind. *Sub carboniferous. XI.*

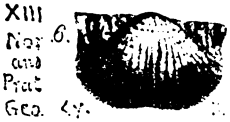


Productus longinpinus. Sowerby's European shell, characteristic of the American coal measures, and one of the smallest. Collett's Indiana Rt., 1883, page 127, plate 24, figs. 10, 11, *natural size*, usual form; but the varieties of this shell are great. Twelve counties of Indiana have yielded this shell. In Pennsylvania, it first appears in the *Mercer lower* and *upper limestones*, *XII* (Q, 68, Q2, 46, 57, 61, 78, 100, 106, 146); then in *Ferriferous limestone* (K, 346; Q, 193, 196, 200, 267), especially abundant on the Beaver river, in Pulaski township (Q2, 46, 106; Q3, 25); then in the *Brush creek limestone*, Ind. town. Allegheny Co. (Q, 68, 154); then in the *Pine creek limestone* (Q, 33, 62); finally and abundantly in Barren measure *Green crinoidal limestone* (K, 80; K3, 309.)—*XII, XIII, XIV.*

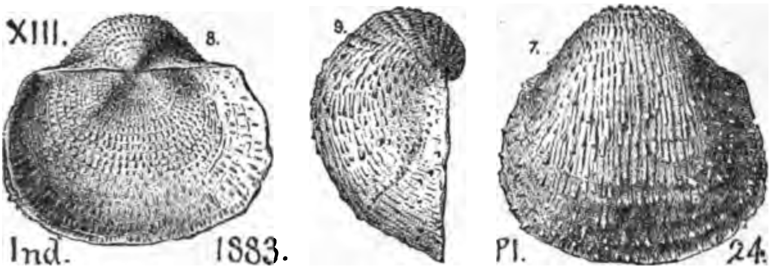

XIII
Ind.
10. 11.
Pl. 24.

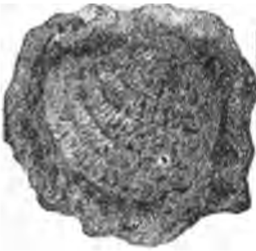
Productus magnus, Meek and Worthen, Proc. Acad. Nat. Sci. Phila., 1861, *Keokuk limestone, XI.*—Seen by C. Hall (MS. Rt. 1876), in Mansfield's Collections at Cannelton, Beaver Co., Pa.—*XIII.*

Productus muricatus, Norwood and Pratten, Iowa, Acad. Nat. Sci. Phila. Aug., 1854, plate 1, fig. 8. Cox, Geol. Kentucky, Vol. 3, 1857, page 573, plate 9, fig. 6. Characteristic and abundant in roof of Coal 9, at Carlow mines, Union Co., Ky., and Lewisport·



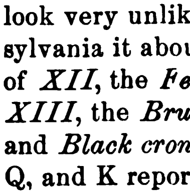
also Salina and Shawneetown mines, Ind. *Upper coal measures. XV.*




4 PRODUCTUS NEBRASCENSIS?

4A PRODUCTUS NEBRASCENSIS?

4B PRODUCTUS NEBRASCENSIS?

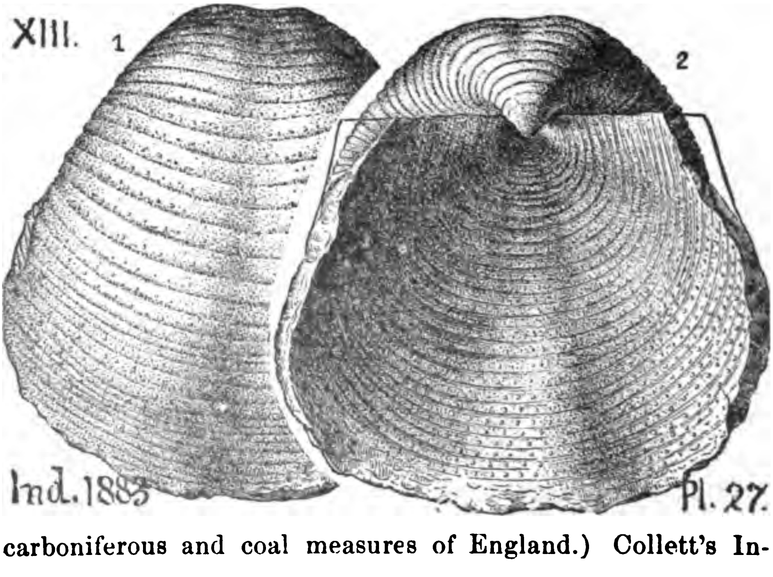


Productus nebrascensis. Owen, Wisconsin Report, 1852, plate 5, fig. 3. Collett's Indiana Rt., 1883, page 122, plate 24, figs. 7, 8, 9, *natural size*, unusually perfect specimen. Common in the Mississippi valley *coal measures*, and frequent in the Rocky mountains. Spines and outer layer seldom recovered from its limestone matrix; hence perfect shells from soft beds look very unlike those got from limestone beds.—In W Pennsylvania it abounds in the *Mercer lower* and *upper limestones* of *XII*, the *Ferriferous limestone* and *Decker's creek shale* of *XIII*, the *Brush creek*, and *Pine creek limestones*, and *Green* and *Black cronoidal limestones* of *XIV*. (See the various L, Q, and K reports.) In Eastern Pennsylvania it is described by Mr. Heilprin in several fairly well preserved specimens of the collection of *Mill Creek limestone* fossils in the Museum of the Wyoming Hist. Soc., Wilkes-Barre, although the dorsal valve is more prominently pustulated (like the English *Productus pustulosus*, Phillips.) Geol. Sur. Pa. An. Rt. 1885, pages 440, 453, figs. 4, 4A, AB. These are found 1000′ above the Pottsville conglomerate in the Northern Anthracite basin, and therefore correspond pretty nearly with those of the *Great limestone* of the western counties, in the *Monongahela series. XII* to *X V.*

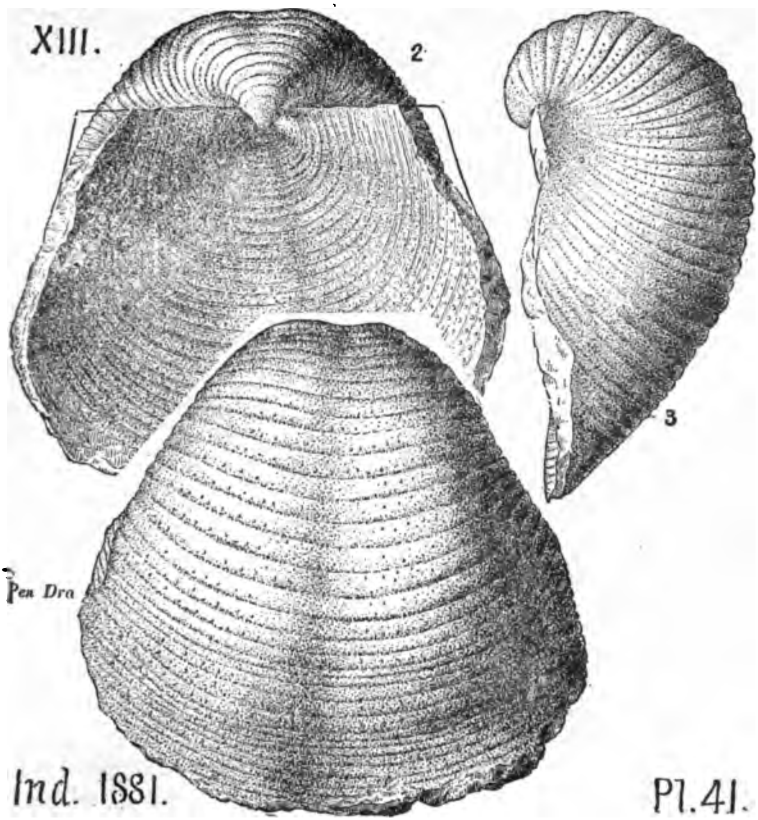
Productus pertenuis, Meek. Pal. East Nebraska coal measures, 1872.—In S. W. Pennsylvania recognized by Stevenson. K3, p. 309.—*XIII.*

Productus prattenianus, Norwood. Jour. Acad. Nat. Sci. Phila. [2] Vol. 3, 1854, *Coal measures.*—In W. Pennsylvania found by White, first in the *Crawford shales, Shenango shales, Shenango sandstone,* all *Waverly* or *Pocono, X;* then in Mercer *lower* and *upper limstones.* in the *Conglomerate, XII;* then over the *Scrubgrass coal* and in the *Ferriferous limestone;* and by Stevenson in the *Freeport upper* (*Decker's creek*) shale, all in *Lower* (*Allegheny*) *productive coal measures, XIII;* then by Stevenson, abundantly, in the *Green crinoidal limestone* of the *Pittsburgh Barren measures.* (K, 80; K3, 309; L, 36; Q, 34, 62, 200; Q2, 46; Q3, 25, 61, 77, 97, 124. (See **P. cora.**) *X* to *XI V.*

Productus punctatus. (Martin, 1809, Petrif. Derb. Lower carboniferous and coal measures of England.) Collett's In-



(**Productus punctatus**, *continued from p. 762.*)



diana Report of 1881, page 373, plate 42 VanCleve's figs. 1, 2, 3, front, back and side views of a full grown individual, from Newport, Ind. *Coal measures. XIII.*—This is one of the best known coal measure shells common to Europe and America. Collett's Ind. Rt. 1883, page 124, plate 27, figs. 1, 2, 3, large example, *natural size.* Ranges from subcarboniferous to top of coal measures. *XI* to *XV.*

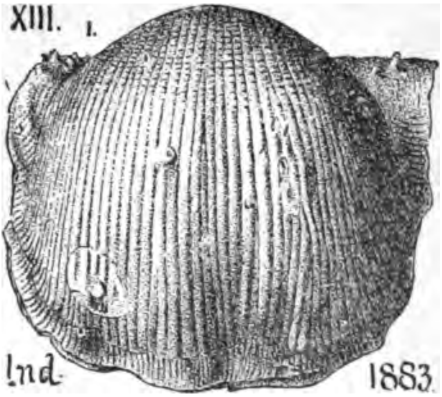
Productus rogersi, N. & P. 1854. *XIII.*

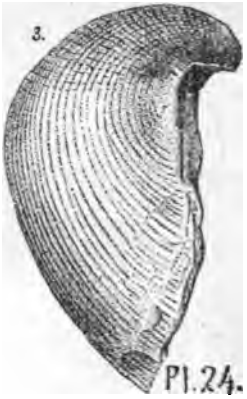
Productus scabriculus. Europe. Near **symmetricus.** *XIII.*

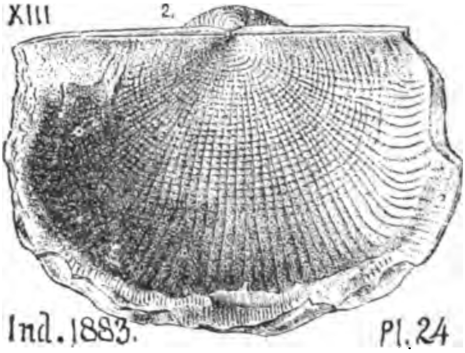
Productus scitulus, M. & W. 1860. *XI.*

Productus semipunctus, Shepard, 1838. *XIII.*

Productus semireticulatus (*costatus?*) Martin's European species, generally recognized widely throughout the American *Lower carboniferniferous and Coal measures.* Collett's Indiana Report of 1883, page 125, plate 24, figs. 1, 2, 3, *natural size*, and large specimen. — Dawson's Acadian Geology, 1868, page 297, figs. 97 *a*, ventral valve, *b*, small specimen showing dorsal valve. This universal *Carboniferous* fossil shell, has been named *Producta martini*, *concinna*, *antiquata*, *scotica*, and *spinosa*, var. of *martini*. (But *spinosa* of Sowerby is a distinct species.) Largest found in any part of Nova Scotia, 1½ inches long and broad. *XIII.* — In Western Pennsylvania it is found by White in the *Ferriferous limestone* of Beaver, Butler, Lawrence and Mercer Cos. (Q,






XIII 2.
Ind. 1883.
Pl. 24

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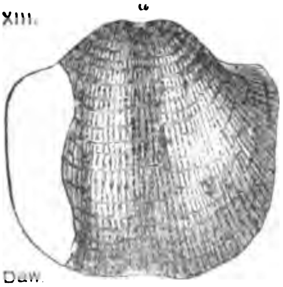
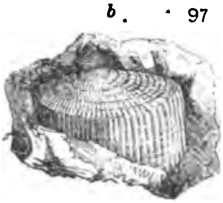


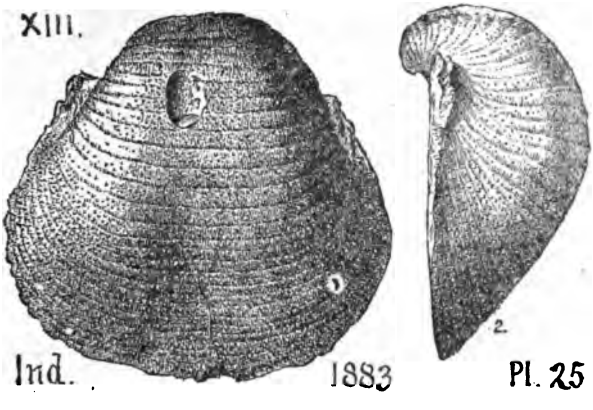


30, 62, 200; Q2, 46, 106; Q3, 25); and abundantly by Stevenson in the *crinoidal limestones* of the four south western counties (K, 80; L, 35.)—*XIII*, *XIV.*

Productus subaculeatus, English, near **indianensis**. *XI.*

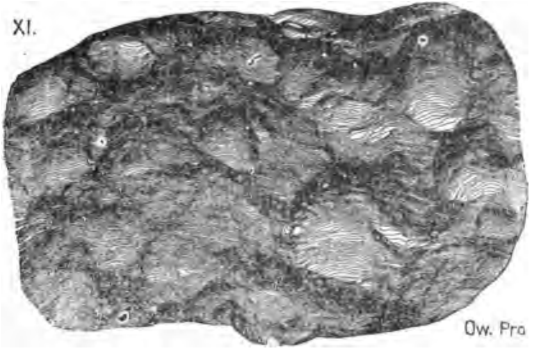
Productus subhorridus, Meek., 1877. *XIII.*

Productus symmetricus. (McChesney. Trans. Chicago Academy of Science, Vol. 1, 1866, page 25, plate 1, fig. 9.) Collett's Indiana Report of 1883, page 123, plate 25, figs. 1, 2, *natural size*, large specimen. Closely related between *Productus nebrascensis* and *punctatus;* and clearly to the European *scabriculus.*—Type in Illinois *coal measures.*—In S. W. Pennsylvania, recognized by J. J. Stevenson (K, p. 80) in the *Crinoidal limestone* of the *Barren measures. XIV.*

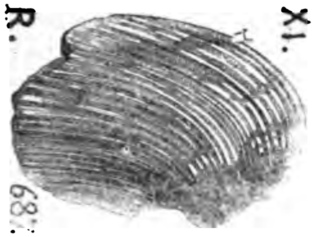


Productus tenuistriatus, Hall, Iowa, 1858. *XI.*

Producti in a western carboniferous limestone, on a slab from near Wayne City, Missouri river; given (medal-ruled) by Owen in his Geol. Wiscon., Iowa and Minnesota, 1852, pl. 3A, fig. 12.—*XI.*



Productus——? H. D. Rogers, Geology of Pennsylvania, 1858, page 832, fig. 687; found in the *mountain limestone* (a western division of the *Mauch Chunk red shale formation*). *XI.*



Productus —— ? Pal. Ohio, Vol. 2, 1875, pages 282. 283.

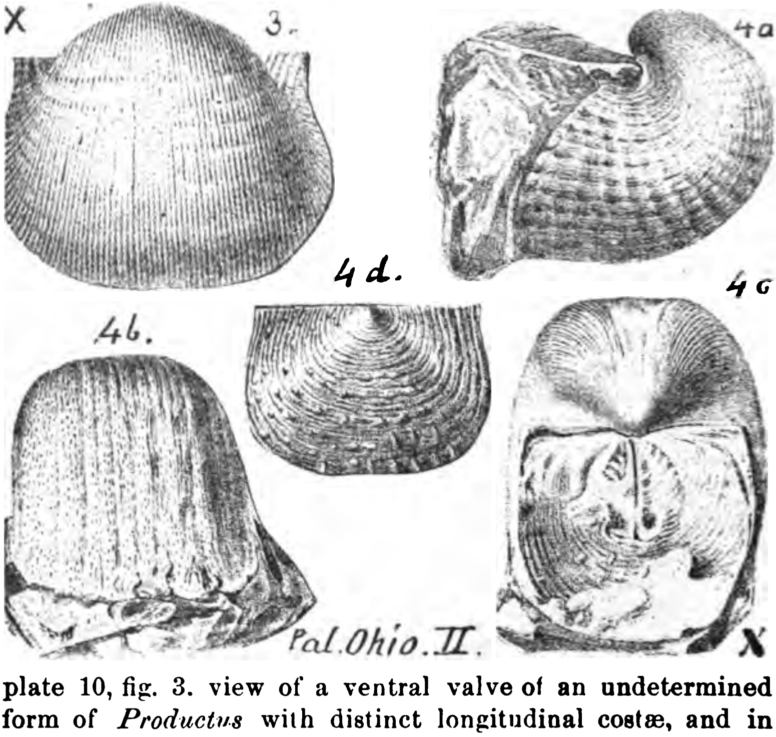
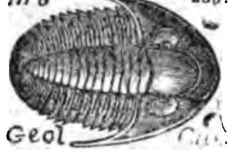


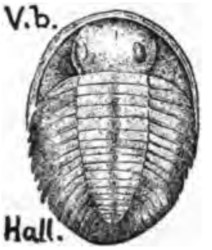
plate 10, fig. 3. view of a ventral valve of an undetermined form of *Productus* with distinct longitudinal costæ, and in various ways differing from *P. semireticulatus*, but perhaps a variety of it, from the Ohio *Waverly group*. Figs. 4*a*, profile of cast of a ventral valve; *b*, front view; *c*, showing cast of interior of dorsal valve also and umbonal region, muscle scars, etc., of ventral valve, of a smaller species or variety, found at many places, in Ohio, in the same *Waverly formation*. *X.*

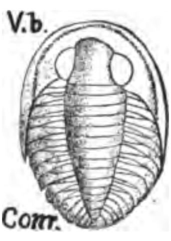
Productus, *undetermined species.* From *Chemung* variegated shale, Tioga Co.. Pa. (O, spec. 3611.) *VIII.* — From *Chemung-Cattskill* sandy shale, Perry Co. (spec. 3615) *VIII-IX.*—In Randall's *Cattskill-Pocono* subdivisions F. G. H, Warren Co. (IIII, 305) *IX-X.*—Abundant in *Panama conglomerate* (*Third Oil sand*, III70) *VIII?*— With *Spirifera*, *Rhynchonella*, etc., in *Oil group* shaly sandstone, east of Bradford bridge in McKean Co. (O, spec. 3403.) *IX.*—In *Bedford* shale, Warren Co. (spec. 3342, 3346) *IX.*—In *Pocono* strata, Venango Co. (spec. 2904, 2907, 2921) and Warren Co. (spec. 2957) *X.*—In Crawford Co. badly preserved in *Meadville lower shale*, *Sharpsville upper sandstone*, in all its outcrops, poorly preserved; abundant in *Meadville upper limestone*, mostly *new* or *undescribed species*, in the main of *Kinderhook limestone facies* (White's Q4, pp. 83, 85, 86, 126.) *X.*—In Huntingdon Co., very abundant in *Shoup's run shales*, in *Pocono rocks*, 600′ above top of *Cattskill*, 800′ to 830′ beneath base of *Mauch Chunk*, Saxton section (T3, pp. 175, 299), *X.*—In Crawford Co., rare and badly preserved in *Chenango upper* (*Mauch Chunk*) *shales* (Q4, 78,) *XI.*—Broken and undeterminable fragments in the *Sub-Olean conglomerate*, (Q4, p. 79) top of *X.*—Also often found in the *Drift* of N. W. Pa. See spec. 3045, 3048.—Finally a *Productus* of great size, as large as a man's fist, occurs in the *Green Crinoidal limestone* of the *Pittsburgh barren measures*, just S. of New garden school house, Raccoon township, South Beaver Co., Pa. (K, 344.)—*XIV.*



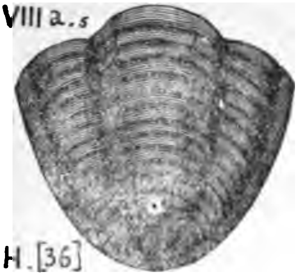
Proetus ataricus, Billings. Geology of Canada, 1863, page 219, fig. 230, *Hudson River slate* (*Loraine shale*) *form.*, *III b.*

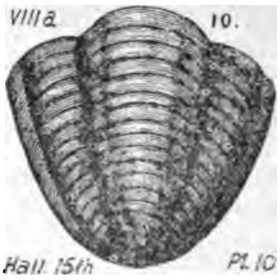
Proetus corycoeus. (*Asaphus corycoeus.*) Hall, Geology of the Fourth New York District, 1843, plate fig. [11, 3] from the *Niagara formation*, *VIII.*—Conrad, Jour. Acad. Nat. Sci. Philada. Vol. VIII, 1824, page 277, plate 16, fig. 15.— *V b.*

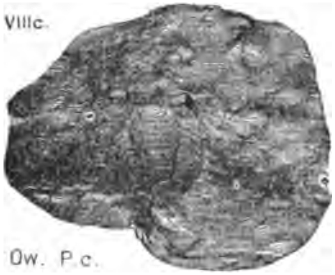




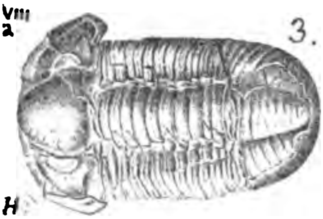
Proetus crassimarginatus, Hall, (*Calymene crassimarginata*, Hall. 4th Dist. N. Y., 1843, page 172, fig. 68, 5, widely distributed in the upper beds of the *Corniferous limestone* of New York.) Hall's 14th Ann. Rept, page 100; and 15th Ann. Rt., plate 10, fig. 10, of the tail-piece of this trilobite associated with a fragment of *Fenestella*, found in the Devonian rocks of Wisconsin and figured by Owen, Geol. Wis. 1852, plate 3A, fig. 6. See also Hall's fine figures in Pal. N. Y., Vol. 7, 1888, plate 20, f. 6–8, 20–31; plate 22, f. 20,–26; plate 25, fig. 8.—*VIII a*.

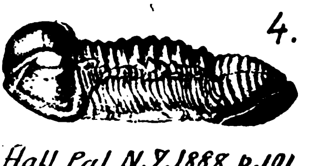




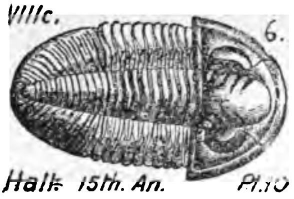


Proetus folliceps, Hall, Pal. N. Y., Vol. 7, 1888, page 101, plate 23, figs. 3, a trilobite, with all its parts in place, but its crust in fragments, showing the round glabella and its furrows; 4, profile view of it showing the convexity of the body. (See Hall's remarks on the median pits upon alternate grooves; and on Walcott's discovery of a ventral membrane possessed by some species of trilobites.) Found at many places along the New York outcrop of the *Corniferous limestone*. *VIII a*.

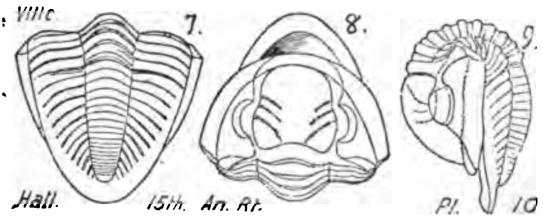



4.
Hall. Pal. N. Y. 1888, p. 101.
Vol. VII, plate XXIII.

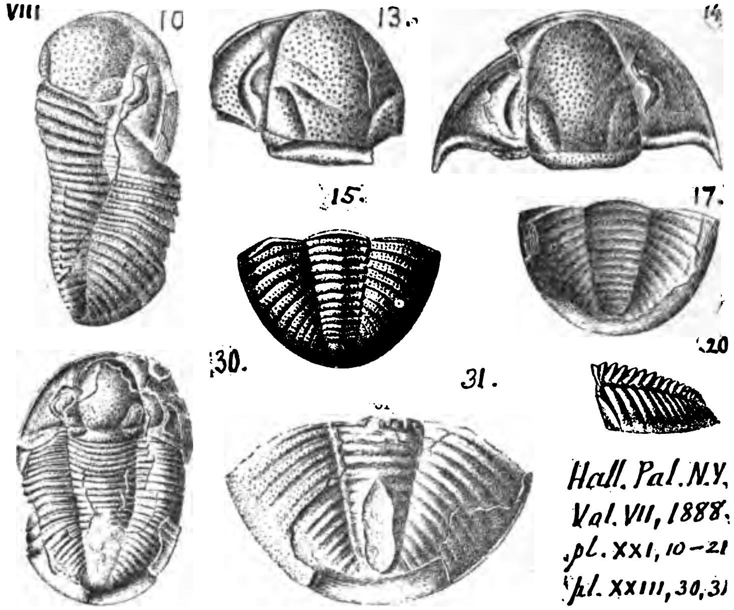
Proetus haldemani, Hall. 14th An. Rt., N. Y., 1861, page 102; 15th An. Rt. 1862, plate 10, fig. 6. It was first discovered in Pennsylvania; Claypole also obtained a specimen in Perry Co., at Drumgold's tannery, on Sherman's creek, (OOO, spec. 12407, 99–41) from *Hamilton upper slates. VIII c.*



Proetus longicaudus, Hall. 14th An. Rt. 1861, page 105. 15th An. Rt. 1862, plate 10, figs. 7, tail, 8, 9, head and side view of the trilobite coiled up. *Hamilton formation, VIII c.*

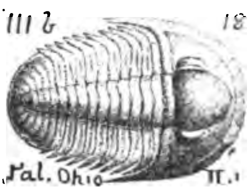

VIIIc
7.
8.
9.
Hall. 15th. An. Rt. Pl. 10

Proetus macrocephalus, 15th An. Rt. N. Y., 1861; Hall, Pal. N. Y., Vol. 7, 1888, page 116, plate 21, fig. 10, a trilobite obliquely crushed, retaining the right eye and fixed cheek; 13,

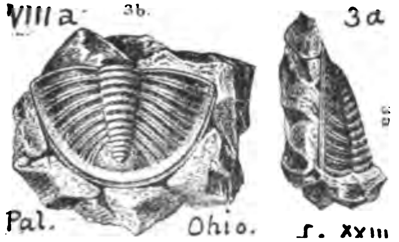


Hall. Pal. N.Y.,
Vol. VII, 1888,
pl. XXI, 10–21
pl. XXIII, 30, 31

part of head, with glabellar furrows; 14, entire head, some furrows; 15, *enlarged twice*, tail of small individual; 17, ditto, showing internal surface and doublure; 20, profile view of 15; plate 23, fig. 30, nearly entire trilobite; 31, tail of a very large specimen. The head is covered with low pimples (tubercles); each ring of the chest and body is covered with granules, sometimes as if in two rows. Whole trilobites are rarely found; and their crusts were so thin and tender that they were easily torn away; the movable cheeks also parted from the head after death, so that only one perfect specimen was found by Hall in several hundreds collected. The species scarcely varies at all, and is quite distinguishable from *P. curvimarginatus* which looks like it. It has been collected at a great many places in New York from the *Hamilton shales*, and *Tully limestone beds*. *VIII c, d.* — In Pennsylvania, Perry Co., one collected by Claypole, at Barnett's mills (spec. 5–67) from *Hamilton upper shales*, *VIII c;* and six others at Slipping Rocks, west of Mexico P. O. (spec. 40–6.–30,–55).—From *Marcellus limestone*, *VIII a.*—Possibly spec. 12584 (151–3) found one mile northeast of Bridgeport, in *Marcellus*. *VIII a? c, f.*



Proetus parviusculus, Hall, Pamphl. 1866, *Cincin. group*, 20th and 24th reports N. Y. State cabinet. Pal. Ohio, Vol. 2, 1875, page 109, plate 4, fig. 18, *enlarged four lengths*, type specimen; surface smooth or very finely granulose; unlike all other American species of trilobite; differs from the the Bohemian *P. sculptus*, Barrande, by having one more thoracic segment, 10 (*P. Sc.* has 9); differs strongly from Meek's *P. spurlocki*, Pal. Ohio, I, p. 161, pl. 14, fig. 12. *III b.*

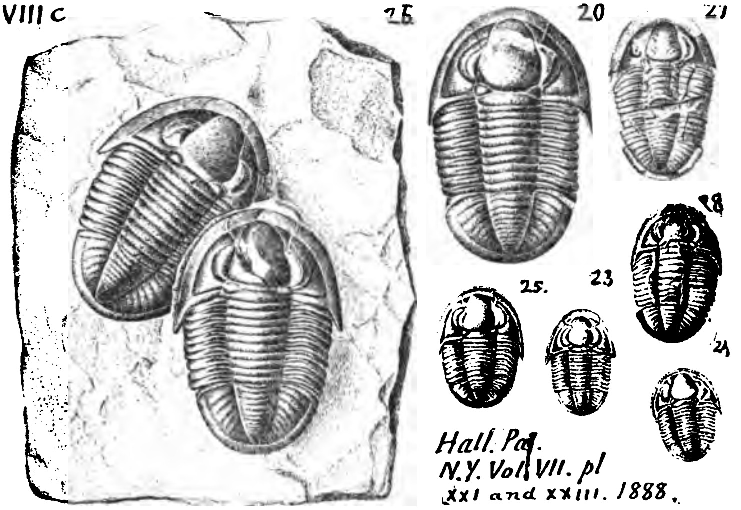


Proetus planimarginatus, Meek. Proc. Acad. Nat. Sci., 1871. Pal. Ohio, Vol. 1, 1873, page 233 [?] plate 23, fig. 3 *a*, *d*, side, and top views of cast of tail (pygidium) from upper beds of *Corniferous limestone* in Lucas Co., O. General outline like *P. haldemani*, Hall, of the *Hamilton strata*, but has a narrower middle lobe, ¼ instead of ⅓ the whole length of the animal, and few segments in the side lobes, with a flattened instead of thickened border; surface as far as seen smooth, and coincides with all the markings of the cast, showing that the skin of the trilobite was like thin horn. *VIII a.*

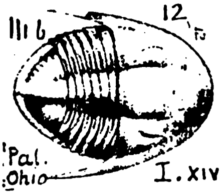
Proetus protuberans, Hall, Pal. 3. *VI.*

Proetus prouti, Shumard, 1863. *VIII c.*

Proetus rowi. (*Calymene rowii*, Green, Am. J. S. XXXIII, 1838, p. 406.) Hall, Desc. New Sp. 1861; 15th An. Rt. N. Y. St. Cab., 1862, p. 103; Ill. Dev. Foss. 1876, 21, 2–6; Pal. N. Y. Vol. 7, 1888, page 119, plate 21, figs. 2 to 6, 24 to 26 (all omitted); plate 23, selected fig. 20, a large entire individual; 23, young, with very large eyes; 24, still younger; 25, a small one with two of his chest segments jammed up under his head-piece; 26, two lying together with average size; 27, natural size; 28, a small one preserving part of the shell. These are from Erie, Ontario and Seneca Cos., N. Y. The head is covered with faint tubercles. It is one of the rarer species of *Hamilton age;* only found abundant and in good condition at one place, on Leaver's creek, Canandaigua township, Ontario Co., N. Y., in the shales and limestone just *over* the dark *Marcellus shales.* It is so like *P. clarus*, Hall, of the *Upper Helderberg*, as to be its descendant, but it has larger eyes and a peculiar marking of its own.—*Hamilton. VIII c.*



Hall. Pal. N.Y. Vol VII. pl XXI and XXIII. 1888.



Proetus spurlocki, Meek, Amer. Jour. S. & A., 1872. Pal. Ohio, Vol. 1, 1873, page 161, plate 14, fig. 12, *magnified three.times;* a trilobite from *Hudson river shale* 100 feet below the hill tops at Cincinnati; with its head-piece (glabella) injured by rubbing and pressure, and slipped slightly backward so as to hide one or more of the thoracic segments. Differs decidedly from Hall's *P. parviusculus.*–*III b.*–NOTE. The young of an *Asaphus.* (S. A. M)

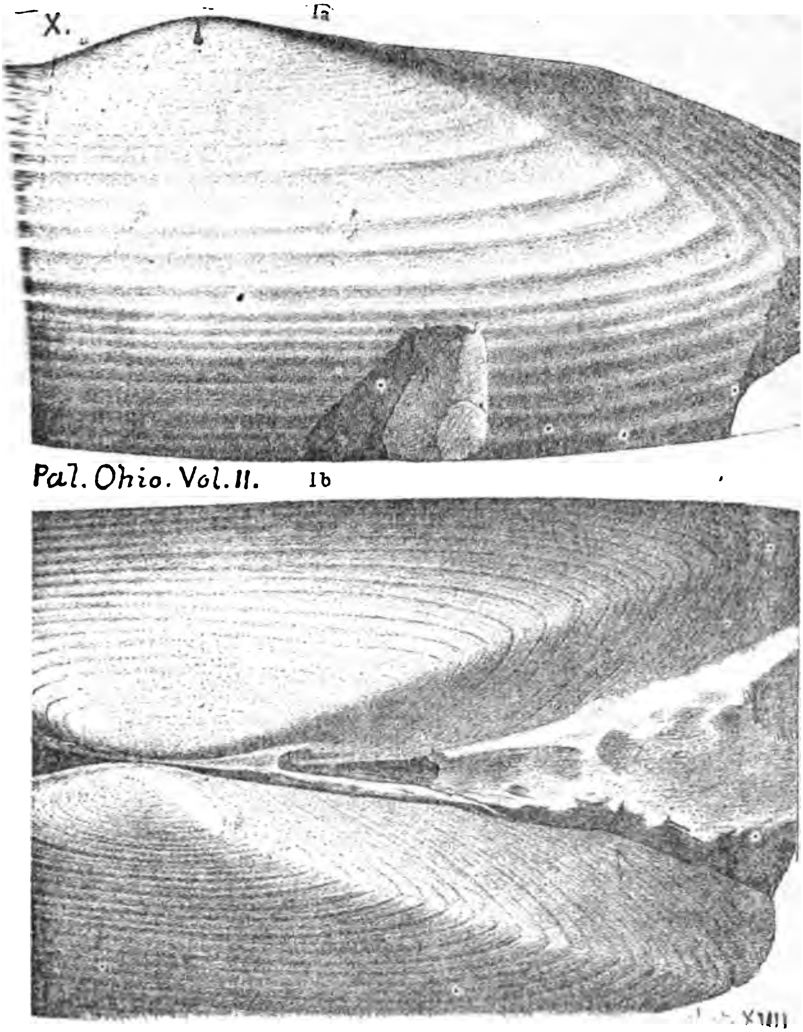
Proetus —— ? Specimen 804–94, associated with *Dalmanites calliteles* (verified by J. Hall, 1889), Fellows' and Genth's collection on Marshall creek, Monroe Co., Pa., from *Hamilton rocks. VIII c.*

Promacrus andrewsi, Meek. (*Fig. on p. 773.*) Am. Jour. Conchology, Vol. 7, 1871. Pal. Ohio. Vol. 2, 1875, page 308, plate 17, fig. 1 *a*, *b*, left side, and dorsal views of an imperfect cast of the exterior. A fine species, nearly 7″ long, intermediate between *P. nasutus*, Meek, and *P. Missouriensis*, Swallow, from which last it differs in its more centrally situated beaks; and from the former by its obtusely rounded umbronal slopes. When the hinge is discovered it may fall under McCoy's *Sanguinolites.* Sciotaville, O. *Waverly. X.*

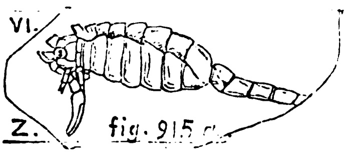
Promylacris ovale, Scudder. A cockroach from Mazon Cr., Ill. Proc. Acad. N. Sc., Phila., 1885, p. 34. *Coal meas. XIII.*

Proteticus infernus. Scudder. A large neuropterous insect found in the *coal measures* of Vermillion Co., Ill. (Mem. Bost. S. N. H. Vol: 3, 1885, p. 334, pl. 31, f. 3, 4. Figure taken from Zittel's Handbuch der Palaentologie, Vol. 2, 1885, page 760, fig. 947 (*enlarged 3 to 2*).—*XIII.*

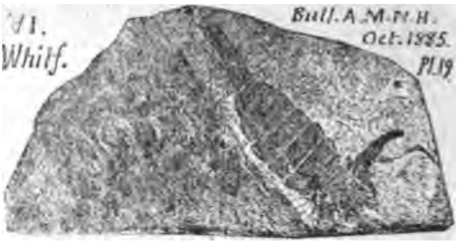
(**Promacrus andrewsi** *figure.—See p. 772.*)



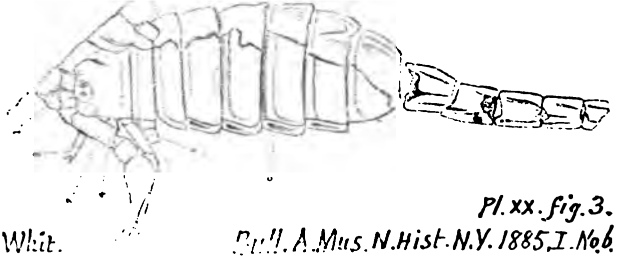
Proscorpius osborni. (*Palæophonus osborni*).) Whitefield, 1885. The first fossil scorpion discovered 1882, at Waterville, N. Y., two years before the Swedish *Palæophonus nuncius* and the Scotch *Glyptoscorpius*,



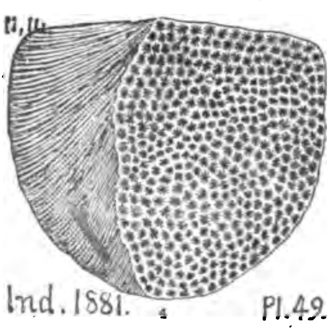
which Peach afterwards was disposed to consider a *Euryterus.* All three in Lower Helderberg (Upper Silurian) formation. Zittel's Handbuch, 1885, Vol. 2, p. 739, fig. 915 *a*, *natural size.* The other figures are of Whitfield's originals in Bulletin American Mus. Nat. Hist. N.Y., 1885, Vol. I, No. 6, page 184. plates 19 and 20. Fig. 3, magnified to two lengths, is an outline sketch of the specimen; 1, mandible 2 palpus; 3, first leg; 4, 5, 6, fragments of other limbs; *a*, spot which represent a breathing hole (*spiracle*) ; *b*, the additional belly plate; *c*, one of the depressions in the skin which looks like a perforation.— *Waterlime formation. VI.*



VI.

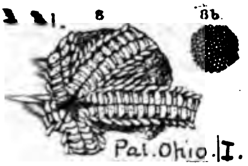


Protarea vetusta, Edwards and Haime. (*Porites vetusta*, Hall, 1847, Pal. N. Y. Vol. 1., Trenton and Hudson river formations.) Collett's Indiana Report of 1881, page 378, plate 49, fig. 4, VanClev's drawing of an Indiana specimen of this widely distributed little coral, which has grown over the surface of a shell (*Strophomena alternata*, ventral valve). *Trenton and Hudson river formations. IIc, III b.*

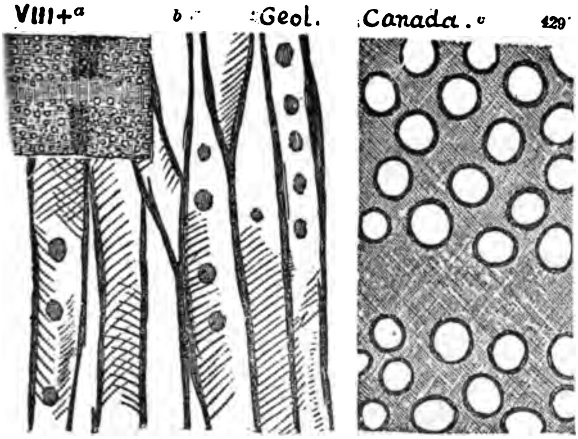

II, III b.
Ind. 1881.
Pl. 49.

Protarea verneulli, Edwards and Haime, Pal. Foss. des terres Palæoz., 1851, p. 209. Silurian. (?, S. A. M.)

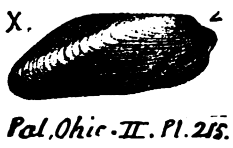
Protaster granuliferus, Meek, Amer. Jour. S. & A. [3], Vol. 3, 1872. Pal. Ohio, Vol. 1, 1873, page 68, plate 2 *bis*, fig. 8 *a*, *magnified*, *about twice* (a unique and imperfect specimen, not conformable in all respects to Forbes' genus), ventral view of part of disc, and inner ends of rays; 8 *b*, *magnified* small portion of minutely granulated skin of dorsal side of disc. Middle of *Cincinnati* (*Hudson river*) *formation* at Moore's Hill, Ind. *III b.*



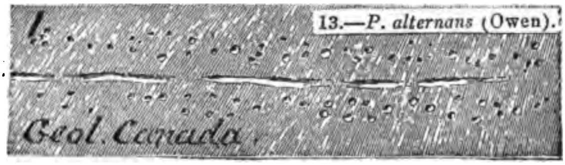
Protaxites logani, Dawson. Geology of Canada, 1863, page 401, fig. 429 *a*, *magnified* (×40) cross-section showing the line of growth and medulary ray; *b*, *c*, *magnified* (× 300) long and cross-sections of the wood. *Devonian Gaspe sandstone. VIII, IX.*



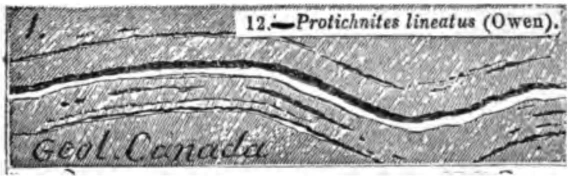
Prothyris meeki, Winchell, MS., 1872. Pal. Ohio, Vol. 2, 1875, page 305, plate 15, fig. 2, *natural size*, right side of cast; easily distinguished from *P. elegans* (type of the genus) by much greater convexity, etc., etc. Rushville, O. *Waverly* (*Lower Carboniferous*, or *Pocono*) *formation. X.*

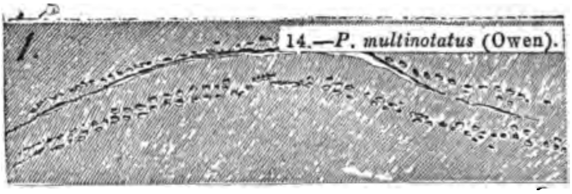


Protichnites alternans, D. D. Owen. Geol. Canada, 1863, page 104, fig. 13. *Potsdam sandstone. I.*

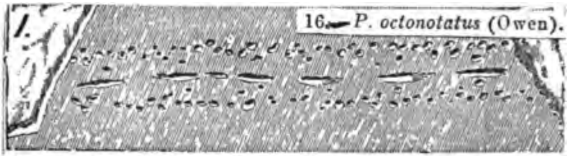


Protichnites lineatus, Owen. Geol. Canada, 1863, page 104, fig. 12. *Potsdam sandstone. I.*



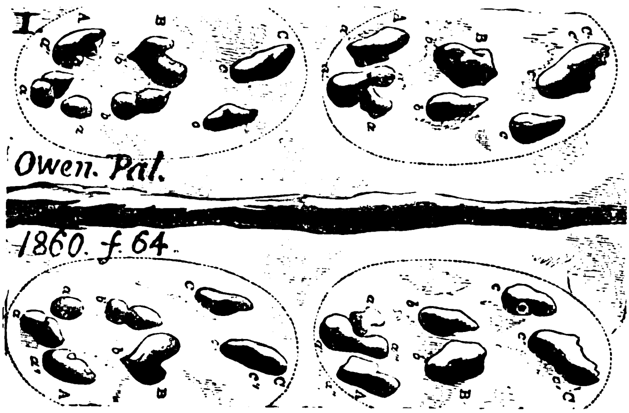


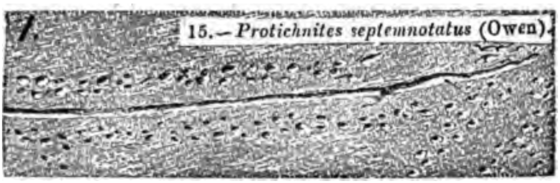
P. multinotatus, Owen, Geol. Canada, 1863, page 104, fig. 14. *Potsdam. I.*



P. octonotatus, Owen, Geol. Canada, 1863, figs. 16, 17, *Potsdam sandstone. I.*

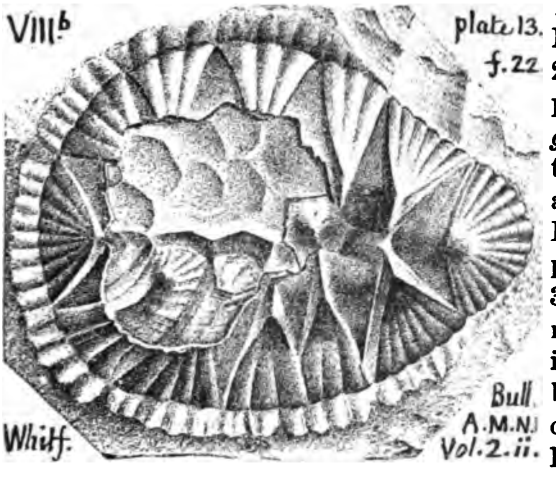
Protichnites septemnotatus, D.D.Owen. Geol. Can., 1863, page 104, fig. 15. *Potsdam sandstone. I.*–R.Owen in his Palæontology. London, 1860, page 158, fig. 64, gives a figure of this last, *natu-*





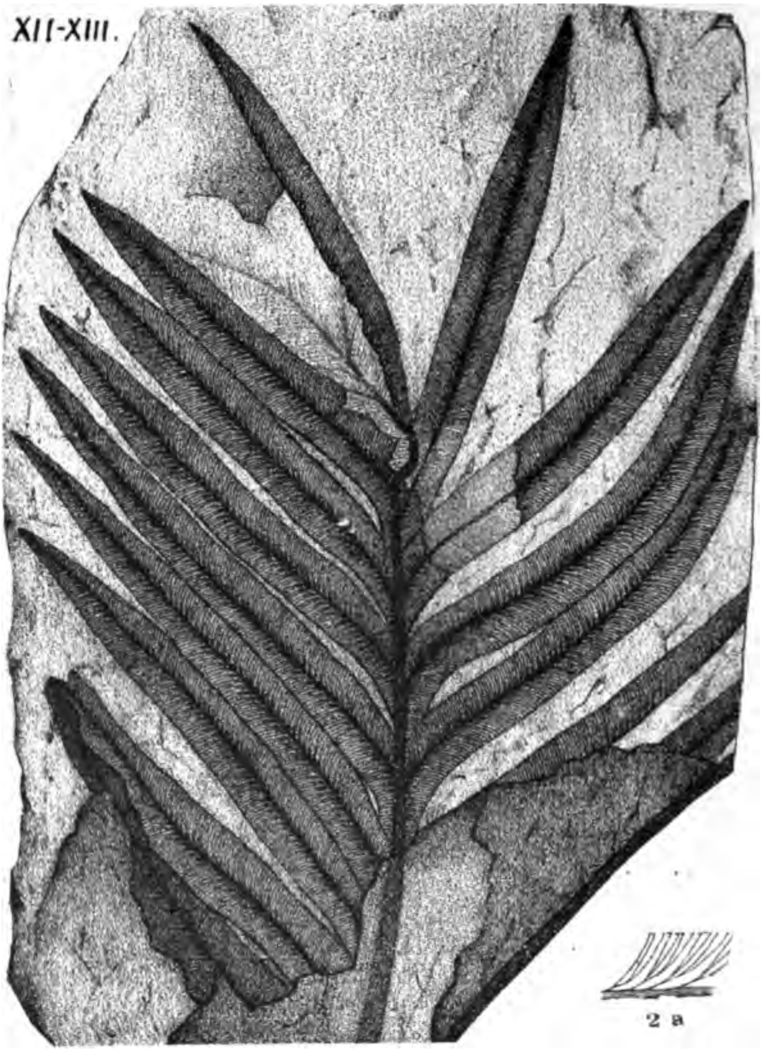
15.—*Protichnites septemnotatus* (Owen).

ral size(?) and discusses the nature of the animal, which must have had (1) in one species seven, in the other eight pairs of legs; or (2) pairs of forked limbs like some living insects and crustaceans, some two pronged, others three pronged, i e. a short broad creature like our hexapods; or (3) three pairs of forked legs, and superadded smaller limbs, as in some living crustaceans, by which odd pits were made; or (4) a seven or eight pointed fin or flipper of the proper shape to make the whole impression, first on one side and then on the other. But no creature now exists to suggest such a mode of walking; to say nothing of the variations in the successive groups of prints. It is most probable that the creature was a sort of crab, with limbs arranged as suggested by either (2) or (3) above. The great King Crab (*Limulus*) comes nearest to realizing this idea, with its small front pair, then four pair of forked legs, then a hind pair with plate like appendages, and a long slender hard tail to make the furrow. But the *Lower Silurian* (*Cambrian*) animal evidently moved forward, and not crab-like sideways.



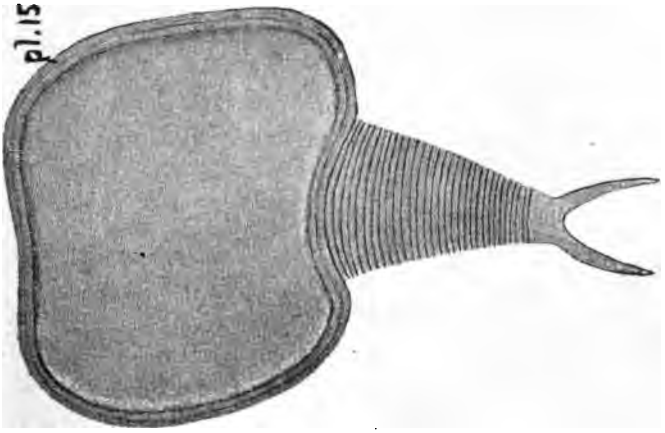
Protobalanus hamiltonensis, Whitfield. Bulletin of the Am. Mus. N. Hist. N. Y. Vol. 2, No. 2, 1889, page 67, plate 13, fig. 22, *greatly enlarged* to scale, (same as fig. 23, in Pal. N. Y. Vol. 7, page 209, plate 36; see foot note.) The carinal plate of this barnacle is subcircular in outline or semi-cirır on the external face; rostral plate short and broad, etc., .; external surfaces marked with rounded ridges, 12 on car- ., 8 on rostrum, 6 on each carino-lateral, 4 on each rostro- .eral, 3 on each lateral; 7 operculaplates in three pairs, etc. . the figure, part of the fringe is covered by an attached shell *Leiorhynchus limitaris*). Found at Avon, N. Y. in *Marcellus hale. VIII b.*

Protoblechnum holdeni. (*Alethopteris holdeni*, Andrews)



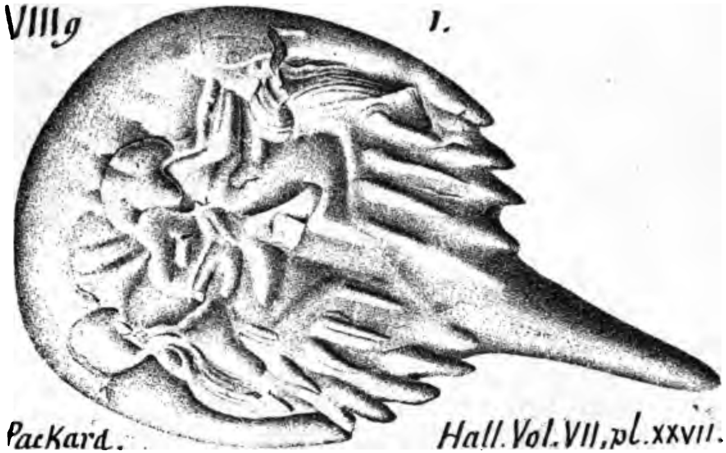
Pal. Ohio, Vol. 2, 1875, page 420, plate 51, fig. 1 (omitted) *natural size* drawing of the lower part of the one single specimen of this fine fern found near the base of the *Coal measures* at Rushville, Perry Co., Ohio; fig. 2, the top of the frond; 2 *a*, the nervation.—*XII-XIII.*

Protocaris marshi. Walcott, Bulletin No. 10, U. S. G. S., page 50, plate 10, fig. 1; Bulletin No. 30, page 148, pl. 15, same figure 1, of type specimen, *drawn twice the size of nature;* flattened by pressure. Looks like the primeval ancestor of all *phyllopod crustaceans.* Parker's quarry, Georgia, Vt.; *Lower Cambrian. L. C.*



Protocyathus rarus. See **Ethmophyllum rarum.** *L. C.*

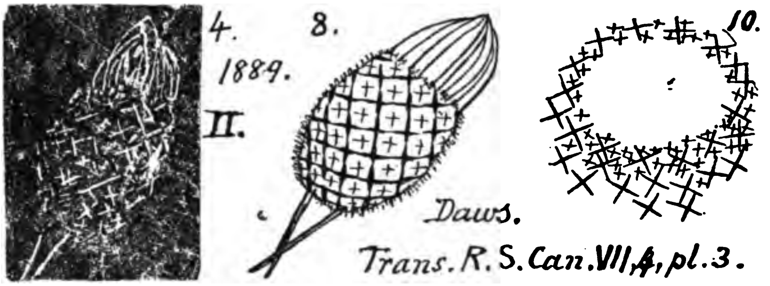
Protolimulus eriensis, Packard. (*Prestwichia eriensis,*



H. S. Williams Am. J. S. [3] xxx, 1885, page 46, figs. 1–3.) Mem. Nat. Acad. Sci. 1886, p. 150, figs. 11–13.—Hall, Pal. N. Y., Vol. 7, 1888, page 153, plate 27, fig. 1, a view of the belly surface, from the original cast in sandstone, (fig. 2, *omitted here*, a diagram of it lettered to explain the parts of this earliest known "King-crab"); the cast is in very high relief, upon a block of fine-grained, compact, olive grey, *Upper Chemung sandstone*, from LeBœuff, Erie Co., Pa. If the specimen came from the *Lebœuff* quarries rock, which J. C. White makes *Third Oil Sand*, its age is early *Catskill*, or very late *Chemung*; the age in which so many interesting species of *Eurypterids* also lived. *See Eurypterus:— VIII–IX.*

Protonopsis horrida, Cope, Pal. Ohio, Vol. 2, 1875, page 363, woodcut.

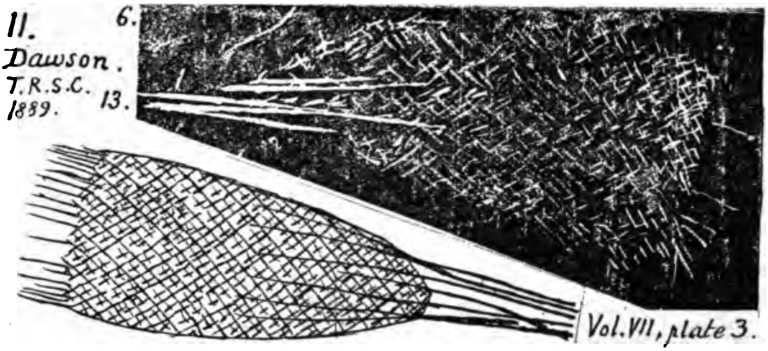
Protospongia coronata, Dawson. This and the following



Trans. R. S. Can. VII, 4, pl. 3.

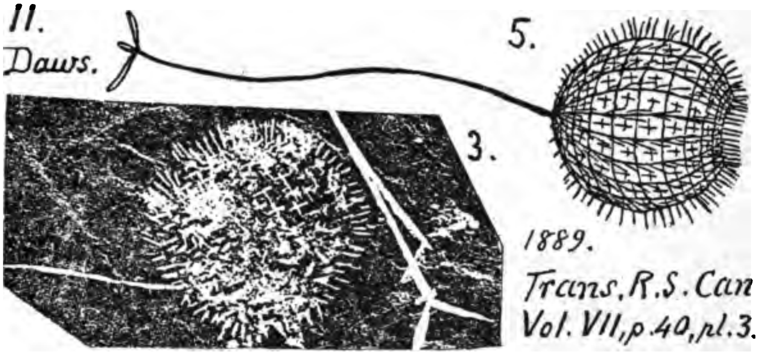
species were first described by Dawson & Hinde in Preliminary notes on new species of Fossil Sponges from Little Metis, Province of Quebec, Canada, Peter Redpath Museum, McGill University, Montreal, Dawson Bros., 1888; and afterwards in Sir J. William Dawson's paper on New Species of Fossil Sponges from the Siluro-Cambrian at Little Metis on the Lower St. Lawrence, with notes by Dr. G. J. Hinde, in Trans. R. S. Canada, Vol. VII, sect. 4, 1889; page 41, woodcut 8, restoration of the sponge; 10, internal cavity; also, plate 3, fig. 4, appearance of the fossil on a piece of slate, as a mesh of needles turned into pyrites, forming the skeleton of the sponge, either free and held by the soft animal tissue as Prof. Sollas thinks, or cemented together at their points of contact, or connected by a spicular membrane as Prof. Hinde believes. The sponge was anchored in the mud by larger spiculæ or rods; for a remarkable and beautiful example of which see (under *Hyalostella metissica*, Dawson & Hinde), in the Appendix.—Found, 1887, at the head of Little Metis bay, south shore of the St. Lawrence river, in black slates of *Quebec Group* (*Lower Silurian*) *age*. *II.*

Protospongia cyathiformis, Dawson. Trans. R. S. Canada, Vol. 7, 1889, page 43, wood cut 13, a restoration of this, Cambro-silurian sponge; plate 3, fig. 6, photograph of its appearance on a specimen of *Metis black slate*. *II.*

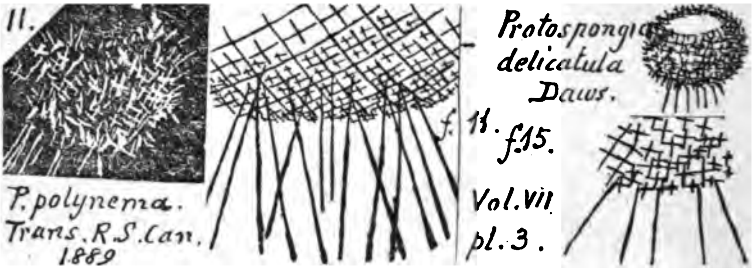


Protospongia delicatula, Dawson. Trans. R. S. Canada, Vol. VII, sect. 4, 1889, page 43, wood cut 15 *a*, restored; *b*, *enlarged* portion of the base of the sponge. *For figures see under P. polynema*.—*II.*

Protospongia mononema, Dawson. Trans. R. S. Canada, VII, p. 40, wood cut 5, a restoration of the sponge; pl. 3, fig. 3, its aspect on a fragment of *Lower Silurian slate*. *II.*

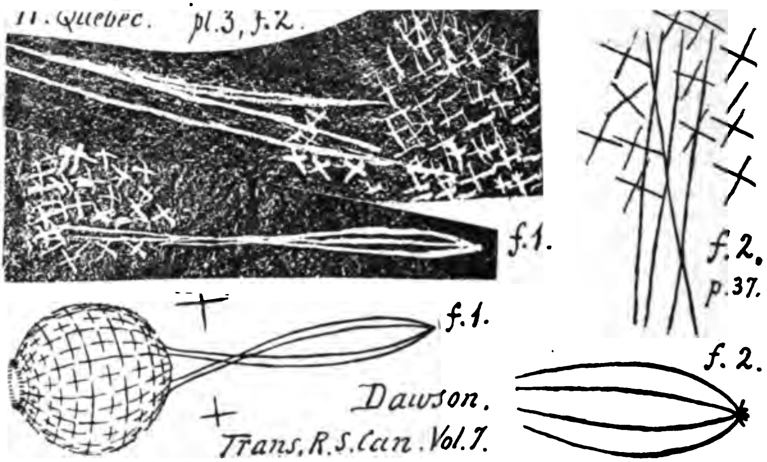


Protospongia polynema, Dawson. Trans. R. S. Can.


II.
P. polynema.
Trans. R.S. Can.
1889
f. 11.
Protospongia delicatula Daws.
f.15.
Vol. VII
pl. 3.

1889, Vol. VII, page 42, wood cut 11, part of base of large specimen; plate 3, fig. 5, appearance of fossil on slate.—With this are given two figures of *P. delicatula;* (*a*) a restoration; (*b*) *enlargement* of part of base.—*II.*

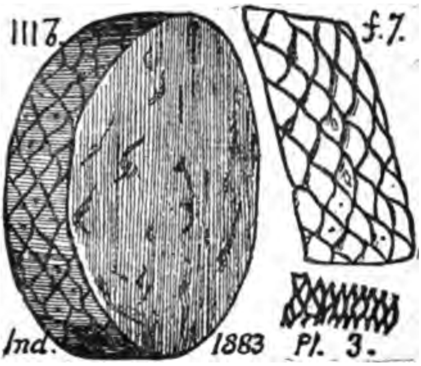
Protospongia tetranema, Dawson. Trans. R. S. Canada,



Vol. 7, 1889, page 37, wood cuts 1,a small specimen restored; 2, anchoring spicules slightly enlarged. Plate 3, figs. 1, 2, appearance of the sponge on the *Lower Silurian* (*Quebec group*) *slate. II.*

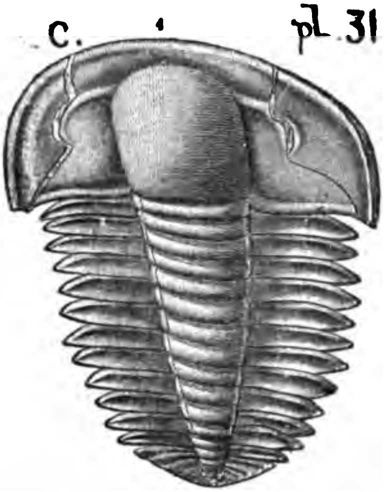
NOTE. For other Sponges found with the above described, at Metis bay, in the same *Ordovician rocks*, see **Acanthodictya hispida, Cyathospongia quebecensis Hyalostella metissica, Halichondrites confusus, Lasiothrix curvicostata,** and **L. flabellata,** all Dawson and Hinde, in the Appendix. With these are found confused masses, isolated groups and solitary sponge spicules, large and small, some extremely slender, others large, long, stout and straight, some parallel, others divergent, or radiating, some anchoring, others perhaps defensive. Dawson, page 52, 53 —*See* **Sponges.**

Protostigma. *Sigillarioides.* Lesquereux, Proceedings of the American Philosophical Society, Philadelphia, 1877. Collet's Indiana Geological Report for 1883, plate 3, fig. 7, 7 *a;* from the *Cincinnati* (*Hudson river*) *slate formation. III b.*

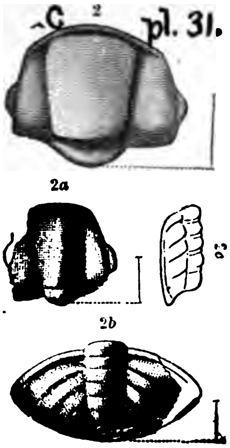


Prototaxites logani, Dawson. (*Nematophycus logani,* Carruthers.) Q. J. G. S. London, Vol. 15, page 484. Supposed by Dawson to be the oldest known exogenous tree in America. Supposed by Carruthers to be a large sea weed. *Devonian. VIII, IX.*

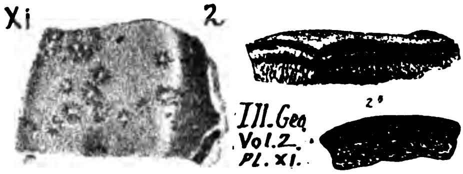
Prototypus hitchcocki. (*Angelina hitchcocki,* Whitfield, 1884, Bull. A. M. N. H., I. 148, pl. 14, f. 13.) Walcott, Bulletin No. 30, U. S. G. S. page 211, plate 31, fig. 4, type specimen figured by Whitfield. *Lower Cambrian* (*Georgian*) formation Parker's quarry, Vermont, *L. C.*



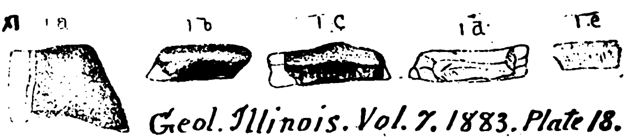
Protypus senectus. (*Bathyurus senectus*, Billings, 1861, Geol. Vt. I, 953, figs. 359, 360; Pal. Foss. I, page 15. Geol. Can 286, figs. 298 *a*, *b*. Also *Bathyurus parvulus*, Billings, 1861, Geol. Vt. II, 953. Compare also *Corynexochus spinulosus*, Angelin, of Sweden.) Walcott, Bulletin No. 30, U. S. G. S. page 213, plate 31, fig. 2, flattened; 2 a, compressed sidewise; 2 b, 2 c, tails (pygidia) found with the heads. *Lower Cambrian* (*Georgian*) slate, at Parker's quarry, Vt.; near Swanton, Vt., and in Labrador. *L. C.*



Psammodus angularis, Newberry and Worthen, Geo. Sur. Ill., Vol. 2, 1866, page 107, plate 11, figs. 2, 2 *a*, 2*b*, upper surface, side, and end of fish tooth. (See other figures in Vol. 7, 1883, pl. 19, figs 1 *a* to 2 *f*. omitted.) The pores of the surface differ from those of *P. rugosus* in being relatively larger, but round, distinct and never confluent. Chester, Ill., in *Chester limestone*. *XI.*

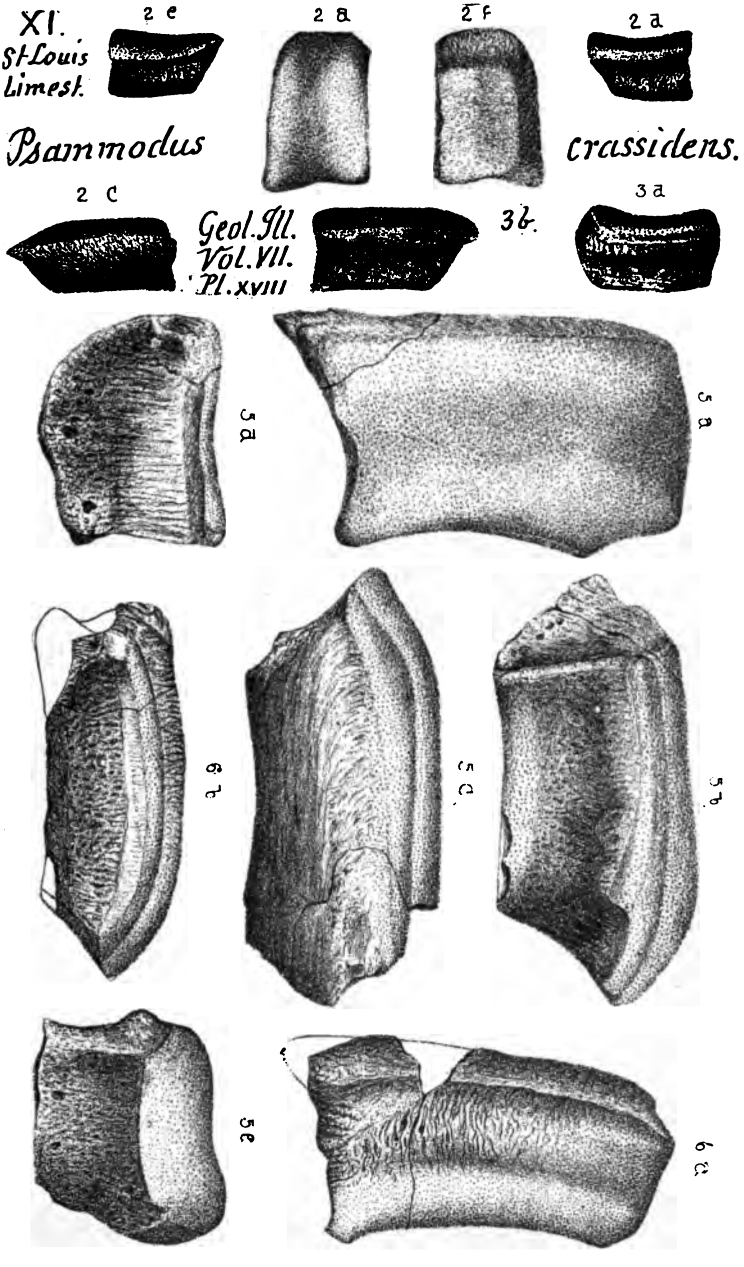


Psammodus cælatus, St. John and Worthen. Geol. Sur. Ill., Vol. 7, 1883, page 217, plate 18, fig. 1 *a*, fish-tooth triturating surface; *b*, *c*, *d*, outside, binder, front edges; *e*, profile section. Iowa. *St. Louis limestone*. *XI.*



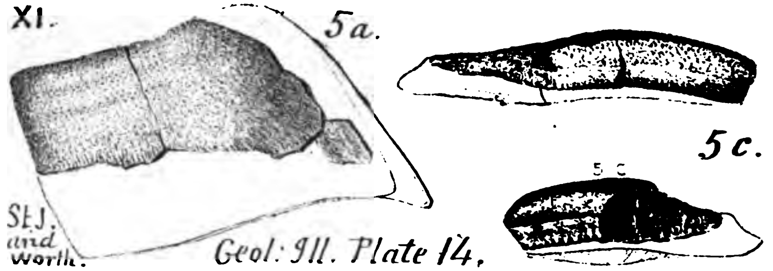
Psammodus crassidens. St. John and Worthen. Geol. Ill., Vol. 7, 1883, page 218, plate 18, selected figs. 2 *a*, a small tooth, crown worn smooth; *b*, *c*. *d*, *e*, inner, outer, hind and front borders; 3 *a*, shorter tooth preserving traces of roughness of crown; 5 *a*, large entire tooth, with crown worn smooth, and prominent base rim outside; 5, *b*, *c*, *d*, *e*, articular, outer,

(Psammodus crassidens, *continued* **)**



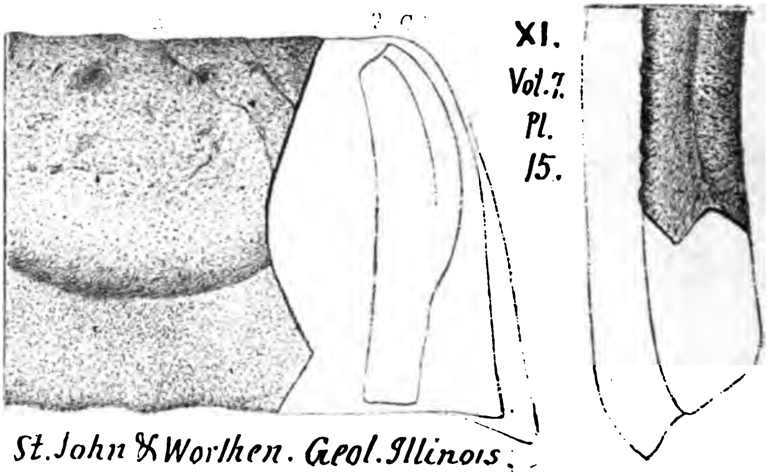
back, and front border; 6 *a* immature large tooth, the inner half preserving the beautiful rough crown surface; *b*, articular border. *St. Louis limestone*, at Alton, Ill.—*XI.*

Psammodus glyptus, St. John and Worthen Geo. Sur.



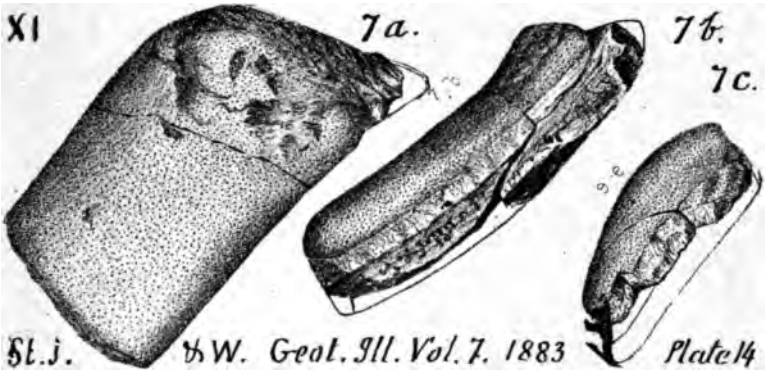
Ill., Vol. 7, 1883, page 209, plate 14, figs. 5 *a*, *b*, *c*, upper right tooth, fragments showing rough crown surface; *b*, back edge; *c*, articular or inner margin. (Omit figs. 6 *a*, *b*, *c*). Cedar Cr., Ill. Main fish-bed in *Upper Burlington limestone*. *XI.*

Psammodus grandis, St. John and Worthen, Geo. Sur.



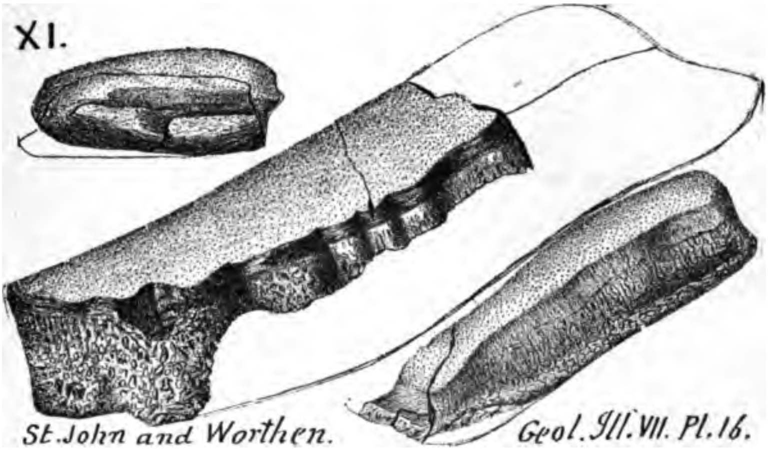
Ill., Vol. 7, 1883, page 211, plate 15, figs. (1 *a* to *d* omitted); 2 *a*, lower tooth of a large fish, showing upper grinding surface, worn with use; *b*, back edge of it; *c* profile. (3 *a*, *b*, *c*, omitted). *Keokuk limestone*. *XI.*

Psammodus lovianus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 207, plate 14, fig. 7*a*, lower tooth, crown

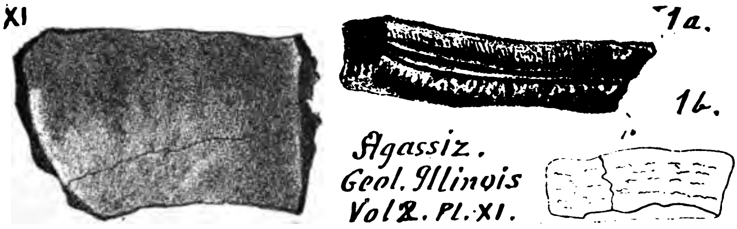


surface; *b*, back edge; *c*, front edge (many other figures omitted.) *Upper Burlington limestone. XI.*

Psammodus plenus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 213, plate 16, figs. 1*a*, to 4*c*, and plate 17, figs. 1*a* to 4*c*. of which I have selected a large tooth belonging to the *St. Louis limestone. XI.*

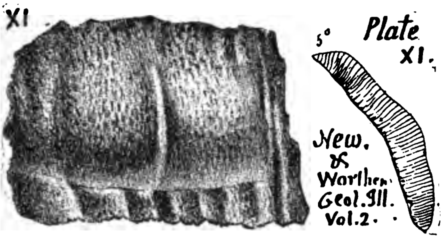


Psammodus porosus ? Agassiz. Recherches Poiss. Foss.

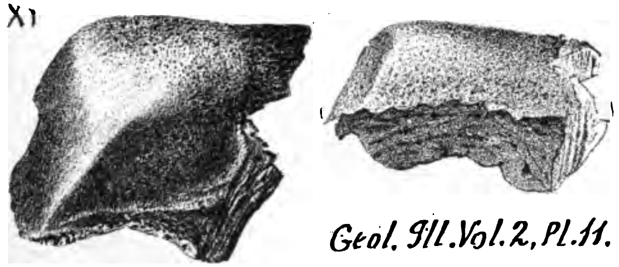


1838. New. & W. Geo. Sur. Ill., Vol. 2, 1866, page 107, plate 11, figs. 1, 1*a*, 1*b*, *natural size*, surface, side and end, of a fish tooth (undistinguishable from those described by Agassiz, in Poissons fossils, Vol. 3, p. 112; Atlas Vol. 3, plate 13), found at Chester, Ill., in the *Chester limestone*. *XI.*

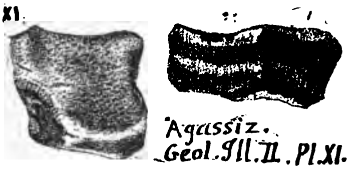
Psammodus reticulatus, Newberry and Worthen, Geo. Sur. Ill., Vol. 2, 1866, page 109, plate 11, figs 5 and 5*a*, *natural size*, upper surface and cross section of a fish tooth, wrinkled crosswise, like *P. rugosus* of Agassiz. (See also Vol. 7, 1883, page 224, plate 19, figs. 3*a*, to 5*c*.) Chester, Ill. *Chester limestone*. *XI.*

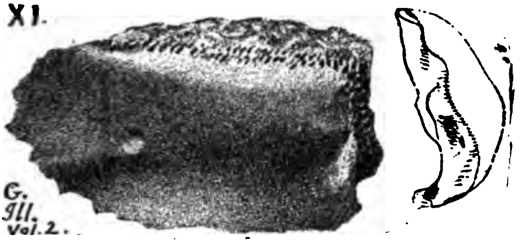


Psammodus rhomboidens, Newberry and Worthen, Geo. Survey of Ill., Vol. 2, 1866, page 110, plate 11, figs, 6, 6*a*, the upper surface and side of fish-tooth, from the *Keokuk limestone* of Illinois. *XI.*—S. A. Miller says in his latest edition of N. A. Geol. & Pal. 1889, that this is a synonym for *Sandalodus lævissimus*.

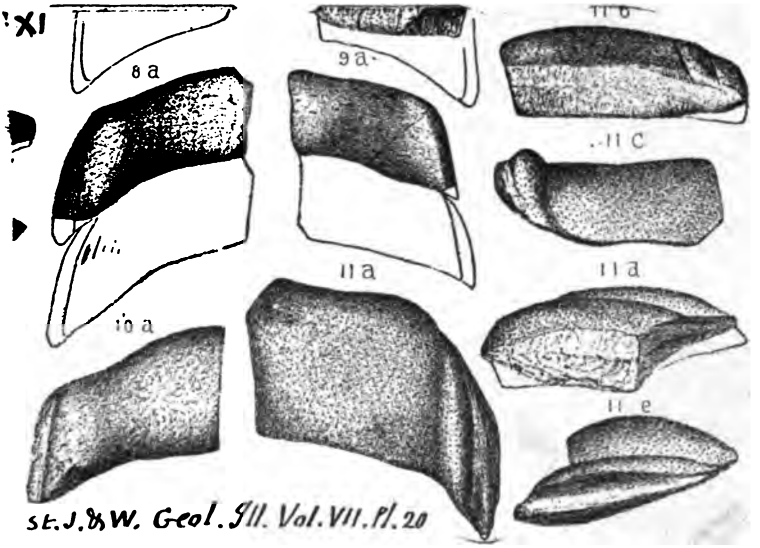


Psammodus rugosus, Agassiz. Recherches Poiss. Foss. 1838, New. & W., Geo. Sur. Ill., Vol. 2, 1866, page 108, plate 11, figs. 3, 3 *a*, *natural size*, upper surface and side view of a small tooth, doubtfully separated from *P. porosus*, because the surface is coarser and rougher, and because they occur in two formations which have few species in common. McCoy regarded Agassiz's two species (*porosus* and *rugosus*) as mere varieties. Alton, Ill. *St. Louis limestone*. *XI.*



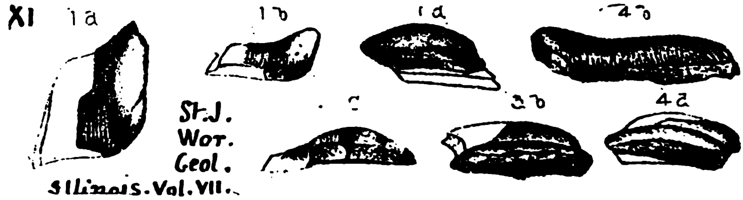


Psammodus ? semicylindricus, Newberry and Worthen, Geo. Sur. Ill., Vol. 2, 1866, page, 109, plate 11, figs. 4, 4*c*, upper surface of profile of a fish tooth somewhat like McCoy's Irish sub-carboniferous *P. canaliculatus*, Brit Pal. Foss. p. 643, plate 3 g, fig. 12, but without its characteristic plications and its rounded crown. The shagreen like roughness of the triturating surface is common to several species of this and allied genera; but is only shown where the enamel coating is unworn; disappearing from long used teeth; and due to raised rings about the ends of the enamled tubes; evidently intended to prevent the teeth from slipping over the smooth shells which the fish had to crush to feed on the soft enclosed animals; in worn teeth the roughness is made by the walls of the tubes. Warsaw, Ill. *Keokuk limestone. XI.*

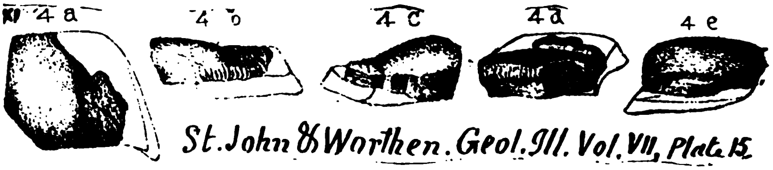


Psammodus springeri. St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 202, plate 20, figs. 4*a* to 11*e* (of which I have only selected the lower set) arranged so as to show the probable arrangement of the teeth in the fish's right and left jaws. The specimens were collected at various places, but all from the upper part of the *Burlington limestone*. *XI.*

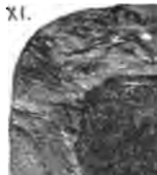
Psammodus tumidus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 205, plate 14, figs. 1*a*, *b*, *c*, *d*; 2*a*; 3*a*, *b*, *c*; 4*a*, *b*, *c*; all from the *Upper Burlington limstone*. *XI.*



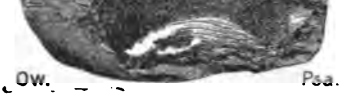
Psammodus turgidus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 206, plate 15, fig. 4*a*, a maxillary tooth, seen from above, restored; *b*, back edge; *c*, front edge; *d*, inner articular edge; *e*, outside edge. Des Moines, Ia. *Upper Burlington fish-beds*. *XI.*



Psammodus ——? a fish-tooth from the Joggin's coal measures on the Bay of Fundy. Dawson's Acad. Geol., 1368, p. 209, fig. 54; one of many such found. *XIII.*

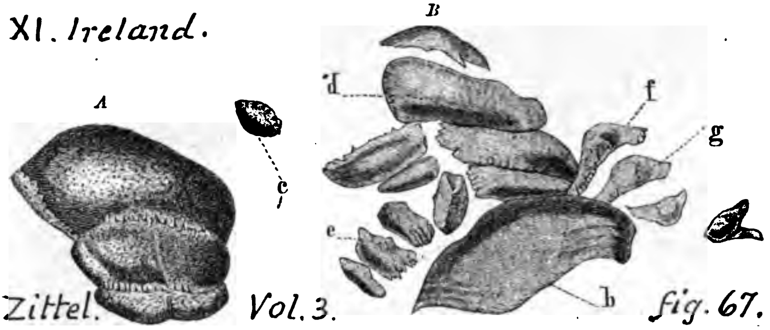


Psammodus ——? part of a fish-tooth from the Keokuk (subcarboniferous) limestone, with *Productus punctatus* and *spirifera cuspidata*. Owen, Geol. Wisconsin, etc., pl. 3A, fig. 20. *XI.*



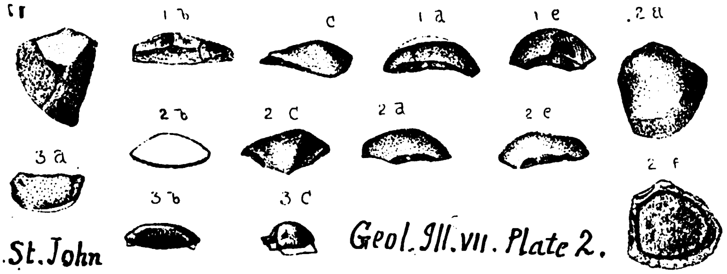
Psephodus magnus, Zittel's Handbuch, Vol. 3, page 73, fig. 67, showing a group of fragments assigned (where found separately) to different fish and called *Helodus rudes* (McCoy), *Helodus planus* (Agas.), *Lophodus didymus* and *Lophodus lævissimus*, thus multiplying needlessly both generic and specific names.—*Subcarboniterous of Ireland. XI.*

XI. Ireland.



Zittel. Vol. 3. fig. 67.

Psephodus latus, St. John and Worthen, Geol. Illinois, Vol. 7, 1883, page 72, plate 2, selected figs. 1*a*, small mandibular median tooth, seen from above, broken; *b*, inner profile; *c*, outer; *d*, hind-side; *e*, front-side; 2 *a*, etc., very small tooth, various aspects; 3*a*, etc., serial tooth, various aspects. *St. Louis* (*subcarboniterous*) *limestone* at Alton and St. Louis. *XI.*

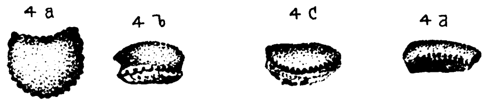


St. John Geol. Ill. VII. Plate 2.

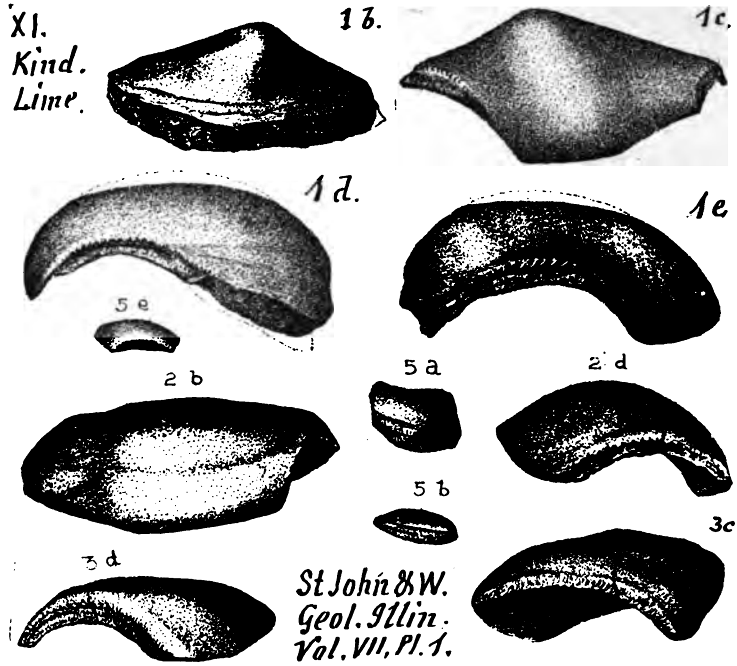
Psephodus lunulatus, St. John and Worthen, Ge. Ill. Vol. 7, 1883, page 74, plate 2, figs. 4*a* to *d*, fish-tooth seen from above, from side, inner, and outer edge. *Chester. L. XI.*

XI. Chester Lim.

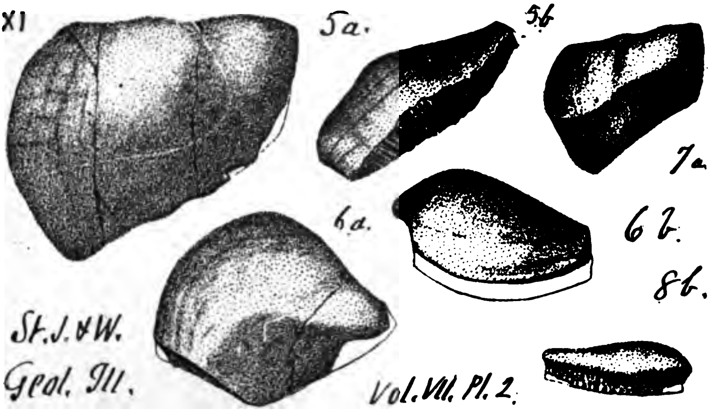
Geol. Illinois Vol. VII. Pl. 2.



Psephodus obliquus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 66, plate 1, selected fig. 1*b*, large middle tooth from right lower jaw, inner margin; *c*, outer; *d*, front-side border, showing fold of the crown; *e*, hind-side border, showing broad waves: 2*b*, *d*, upper jaw middle tooth; 3d, c, from left lower jaw; 5 *a*, *b*, very small shortened tooth. *Kinderhook* (*subcarboniferous*) *limestone*. Burlington, Iowa. *XI.*

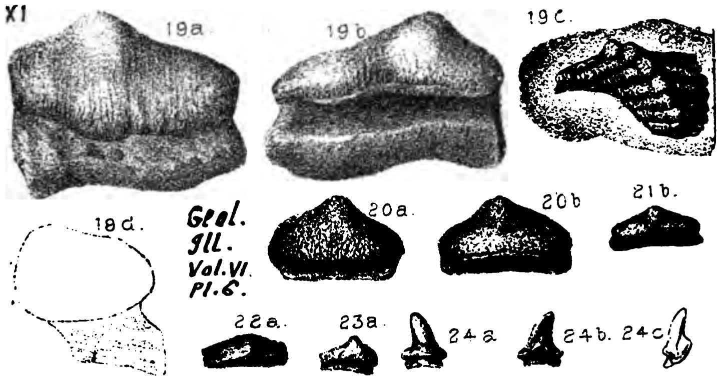


Psephodus placenta, St. John and Worthen, Geo. Sur. Ill.

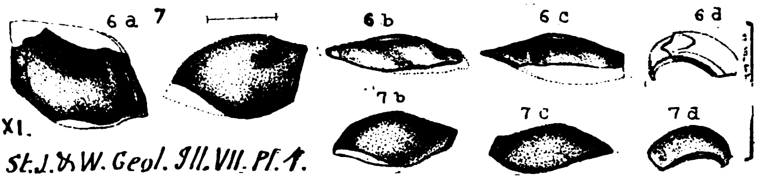


Vol. 7, 1883, page 69, plate 2, selected fig. 5*a*, mature right upper jaw tooth, crown; *b*, inner edge; 6 *a*, *b*, small tooth; 7 *a*, longer upper left jaw; 8 *b*, short middle upper left jaw tooth, crown much worn in front (original specimen of *Helodus placenta.*) *Kinderhook*. Burlington, Iowa. *XI.*

Psephodus reticulatus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 417, plate 6, selected fig. 19*a*, very large back tooth, back face; *b*, outer face; *c*, outline of crown seen from above; *d*, profile section; 20 *a*, medium size tooth, inner face, *b*, opposite face; *c*, profile section; 21 *b*, smaller tooth, net-work ornamentation restricted to the basal border; 22 *a*, worn tooth without ornamentation, crown; 23 *a*, hind face of small tooth; 24 *a*, *b*, hind and outside faces of small tooth, *c*, profile outline. *Kinderhook limestone*, Iowa. *XI.*

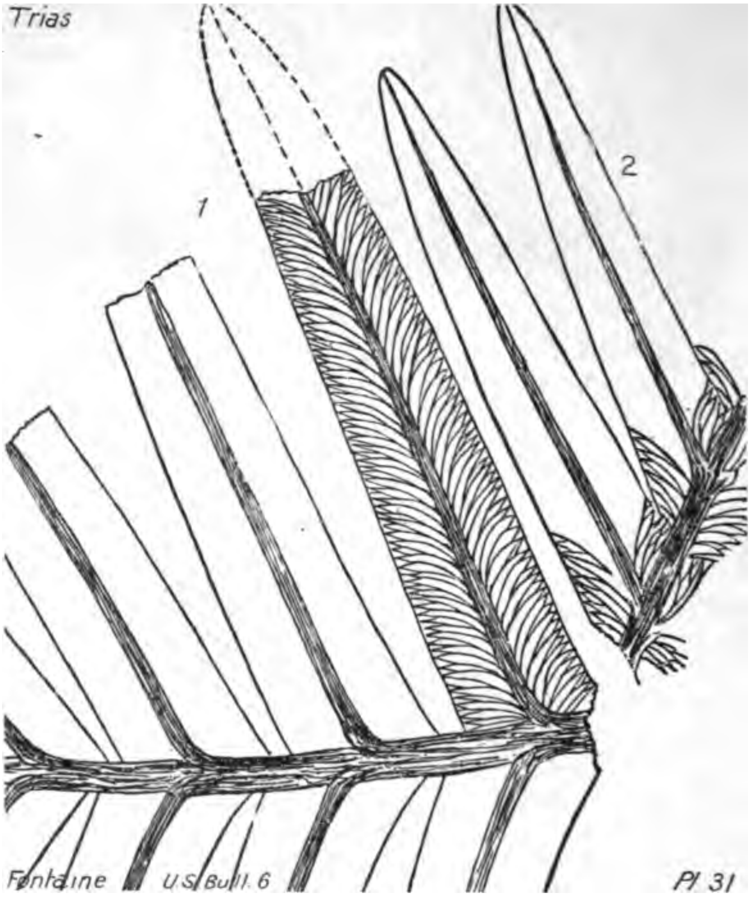


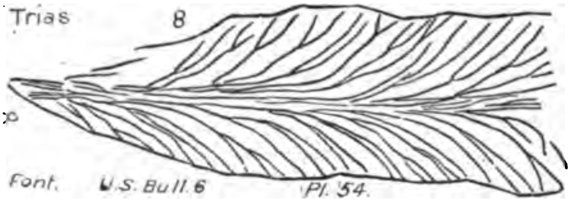
Psephodus symmetricus, St. John and Worthen, Geo. Sur. Ill., Vol. 7, 1883, page 71, plate 1, figs. 6 *a*, *b*, *c*, *d*, tooth from right upper jaw, from the *Kinderhook lower fish-bed;* 7 *a*, *b*, *c*, *d*, *enlarged*, a very small nearly entire tooth from the left lower jaw, *upper fish-bed.* Burlington, Iowa. *XI.*



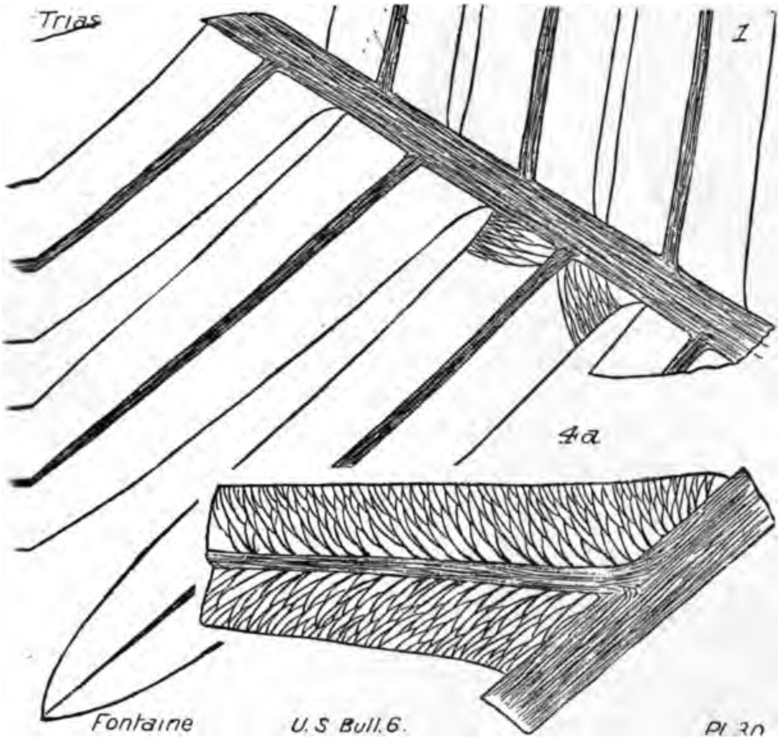
Pseudocrania anomala, Winchell. *VIII c.* (S. A. M.)

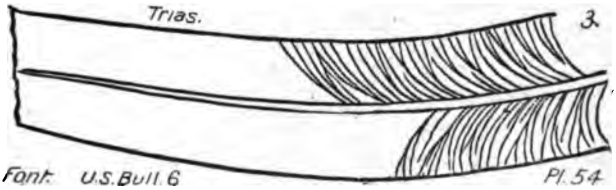
Pseudomonotis hawni, Meek & Hayden. *See on page 796 below.*





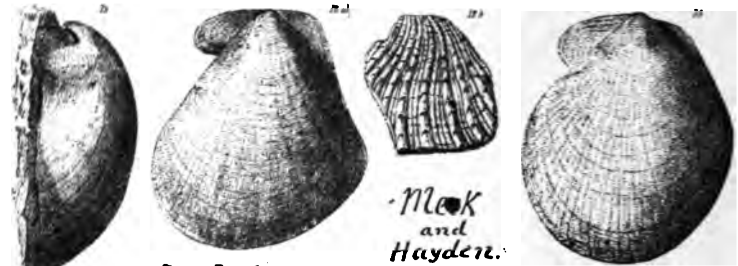
Pseudodanæopsis nervosa, Fontaine. Monogr. U. S. Geol. Sur. Vol. 6,1883, page 61, plate 31, fig. 1, with pinnules of normal size; 2 from upper part of plant. Also, plate 54, fig. 8. Nervation so distinct that the side nerves often appear on the shale when no trace remains of the leaf substance. (See fig. 2, right hand.) Some forms by Newberry resemble it in some respects, e. g. his *Tæniopteris glossopteroides* from Los Bronces, Sonora, a locality which has yielded so many species like those of the Virginia Trias coal fields. Probably Emmons, *Strangarites obliquus* from N. Carolina. Rarer than *P. reticulata ;* only found in a Clover Hill dark shale of the upper small coal series. *Trias.*





Pseudodanæopsis reticulata, Fontaine, Monogr. U. S. Geol. Sur. Vol.16,883, page 59, plate 30, frond *restored* with large pinnules ; *a*, much *magnified* small pinnule from another specimen. (Other figures omitted.) Also plate 54, fig. 3. Can be recognized instantly by its prominent midrib and the thick texture and straight border of its pinnules, which are usually found detached and scattered, almost never attached however carefully looked for. It is evidently Emmons' *Strangerites* *planus* of N. Carolina. Widely diffused in Virginia, and not uncommon at Clover Hill, Midlothian; and at Carbon Hill in the shaly sandstones over the lower coal bed. *Trias.*

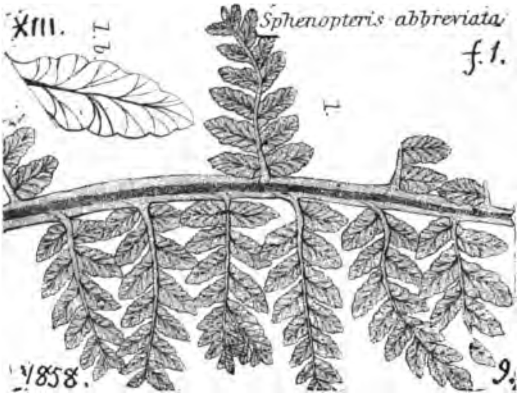
Pseudomonotis (*Eumicrotus*) **hawni, Meek and Hayden,**



Geol. Ill. Vol. 2. 1863. Pl. 27.

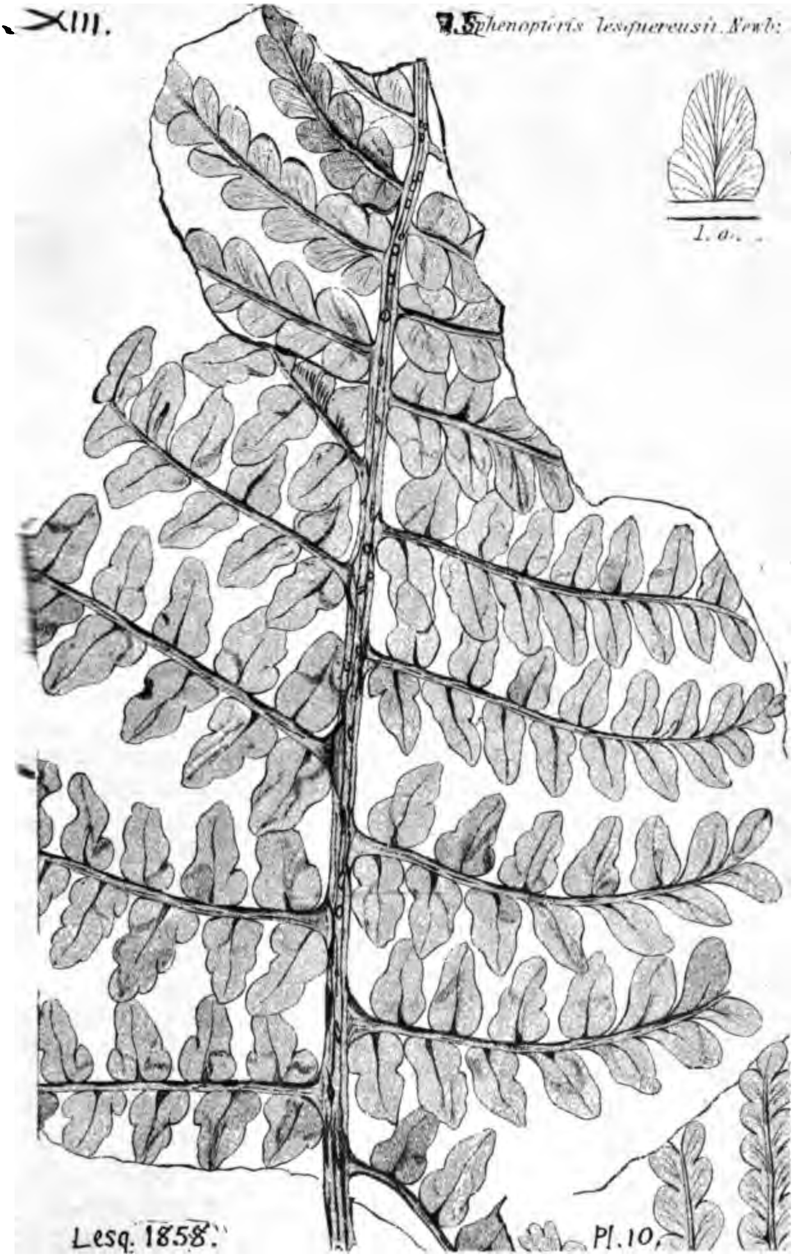
Geol. Ill., Vol. 2, 1866, page 338, plate 27, fig. 12, inside cast of left valve, front view; *a*, side view, showing sinuous margin; *b*, surface markings of left valve; (13, omitted); 14, cast of another left valve. From a bed once supposed to be probably *Permian.*—(*This belongs on p. 793 above.*)

Pseudopecopteris (*Sphenopteris*) **abbreviata.** Lesq. Geol. Pa., 1858, p. 861, pl. 9, fig. 1, 1*b*; resembling the European *Sphenopteris palentissima*, Goeppert, Gate Vein, Port Carbon, Pa., the only specimen found; it is intermediate between *Pseudopecopteris newberryi* and *P. Cordata-ovata*, Lesq. Coal Flora, 1880, p. 203. *XIII.*

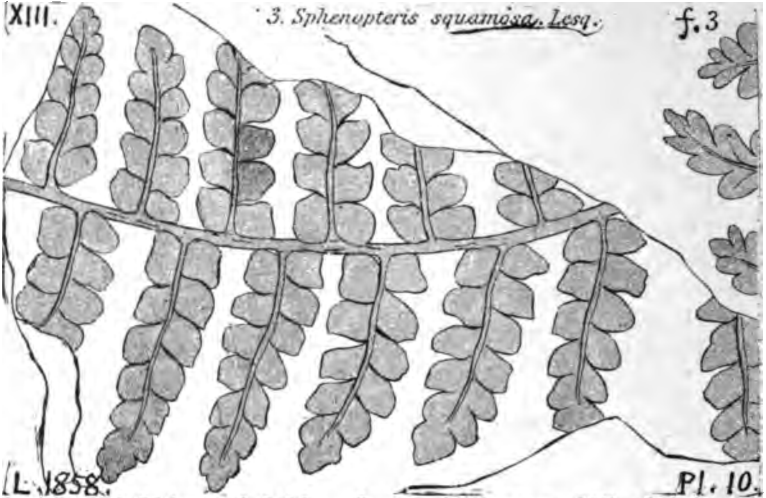


Pseudopecopteris anceps. (*Sphenopteris squamosa*), Lesquereux. Also *Sphenopteris lesquereuxii*, Newberry Annals of Science. Lesquereux, Geol. Pa., p. 862, plate 10, fig. 1, from the Room Run anthracite mines, near Mauch Chunk, Pa. Its nervation would put it with *Neuropterids*, as an *Adiantites;* but the leaflets suggest *Sphenopteris latifolia;* common in the

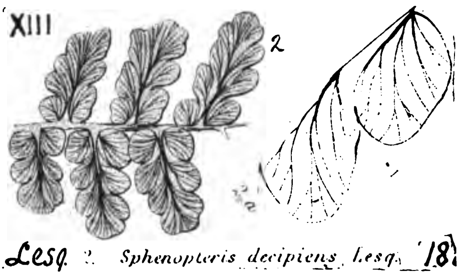
(**Pseudopecopteris anceps,** ***continued***)



(**Pseudopecopteris anceps**, *continued.*)



Penn. and Ohio coal fields. In Coal Flora, p. 207, pl. 38, figs. 1 to 4, Lesquereux describes it as wearing many shapes (polymorphous); large leaves in Lacoe's cabinet at Pittston, Pa., show these variations. *Pecopteris sillimanni* is closely allied, but with smooth skin, etc., etc. First seen in anthracite tunnel in Sharp Mtn, Pottsville; also Brown colliery, Pittston, Wilkes-Barre; abundant in the Cannelton (Kittanning) coal roof; in Illinois low coals. XIII. NOTE.—Fig. 3 (*squamosa*) was found with *Dictyopteris obliqua*, at S. Salem vein, Pottsville. NOTE—Recognized by Lacoe in Koch's collections from the Tipton Run coal beds in Blair Co., Pa., July, 1889. These beds I assign to the *Pocono formation*. *X*. J. P. L.



Pseudopecopteris (*Sphenopteris*) **decipiens**, Lesq. Geol. Pa., 1858, p. 862, pl. 18, fig. 2, 2*a*; easily mistaken at sight for both *Sphenopteris latifolia*, and for **Alethopteris nervosa**; but differs from both by its remarkable nervation, the little nerves branching not from the middle but from the lowest nervule, which runs parallel to and very near to the main (median) nerve. It is

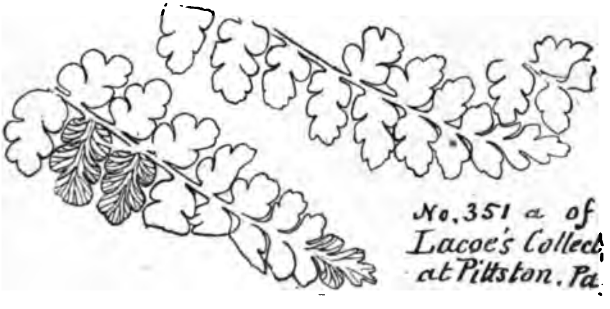
Sphenopteris dilatata, Lesq. Coal Flora, 1880, p. 214, pl. 52, fig. 9, 9*a*, 10, 10*a*. The figure from the lower coal in the conglomerate (No. XII) in the gap at Shamokin, Pa. The Coal Flora figures are from *Subconglomerate* coal (XI) of Arkansas. *XI*, *XII.*

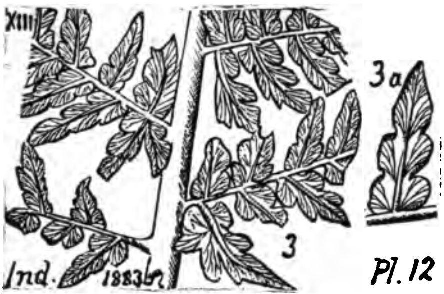
Pseudopecopteris (*Sphenopteris*) **glandulosa,** Lesquereux, Geol. Pa., 1858, p. 862, pl. 9, fig. 2, Coal Flora, 1880, p. 210, found at Shamokin, coal bed uncertain, but probably low in the series, specimen unique; but reported by I. C. White, from the base of *Pottsville conglomerate;* subsequently found in the bottom of the *Pottsville conglomerate*, at Campbell's ledge, Pittston, by W. Lacoe. (G7, p. 39.)—*XII.* (*See figure under Sphenopteris glandulosa.*)

Pseudopecopteris irregularis, Lesq. (*Sphenopteris irregularis*, St.; *S. latifolia*, L. & H.; *S. trifoliata?* Brngt.) Coal Flora, p. 211, pl. 52, figs. 1—3*b*, 8. Clinton, Mo., and Colchester, Ill. Also under Campbell's ledge, Pittston. (G7, p. 39.) *XII.*

Pseudopecopteris loschii. Lesq. (*Pecopteris loschii*, Brgt.) found by Lacoe, under Campbell's Ledge conglomerate, near Pittston, Pa. (G7, p. 39.) *XII.*

Pseudopecopteris macilenta, Ll. and Hutton, G. B. Simpson's drawing (1889) of specimen No. 351 *a* in Mr. Lacoe's collection at Pittston, Pa. Coal Flora, page 219, 754, 830, plate 98, fig. 2 (not given here.) Lesquereux says: simular in all respects to *Cyclopteris valida*, Dawson, (Dev. Plants, in Q. J. G. S. London, XVIII, p. 319, pl. 17, f. 52) of the New Brunswick Canada *Devonian*, and found in Pennsylvania in Upper Devonian. *P. macilenta* is found at Cannelton, Beaver Co., Pa., in the *Lower Productive coal measures*, *Kittanning series*. *XIII.*



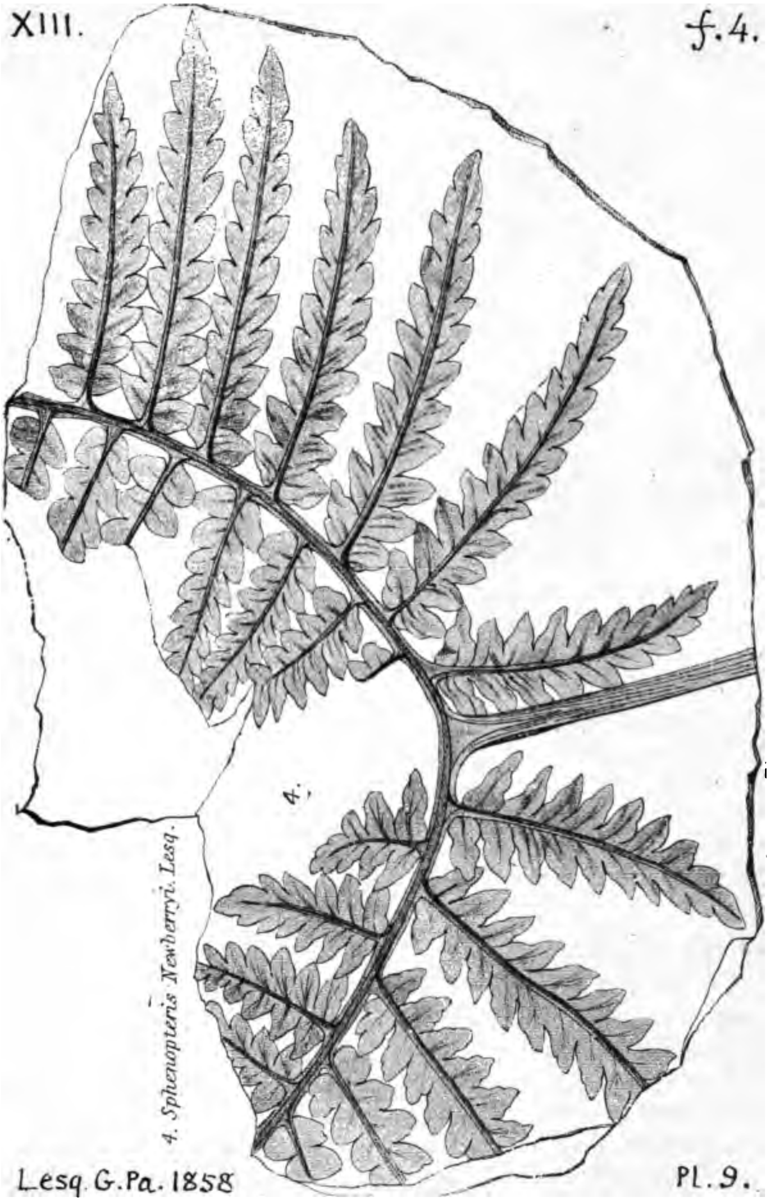


Pseudopecopteris muricata (*Pecopteris muricata* Brongniart Hist. V. F. pl. 97. *Pecopteris laciniata*, Ll. and Hutton, plate 122. *Alethopteris muricata*, Goepp. also Lesquereux, Geol. Pa., 1858; Illinois Report 4.) Coal Flora of Pa., 1880, page 203, plate 37, fig. 2. Collett's Indiana Rt. 1883, plate 12, fig. 3, 3 *a*. Rarely in large fragments. Very fine specimens from Black Vein, Alabama. A few from Sharp Mountain tunnel at Pottsville. Some in Mazon Creek nodules, Ill. More in coal shale, Rhode Island. Not seen at Cannelton, W. Pa., nor at Pittston, Luzerne Co., Pa. Lesq. *XII. XIII.*

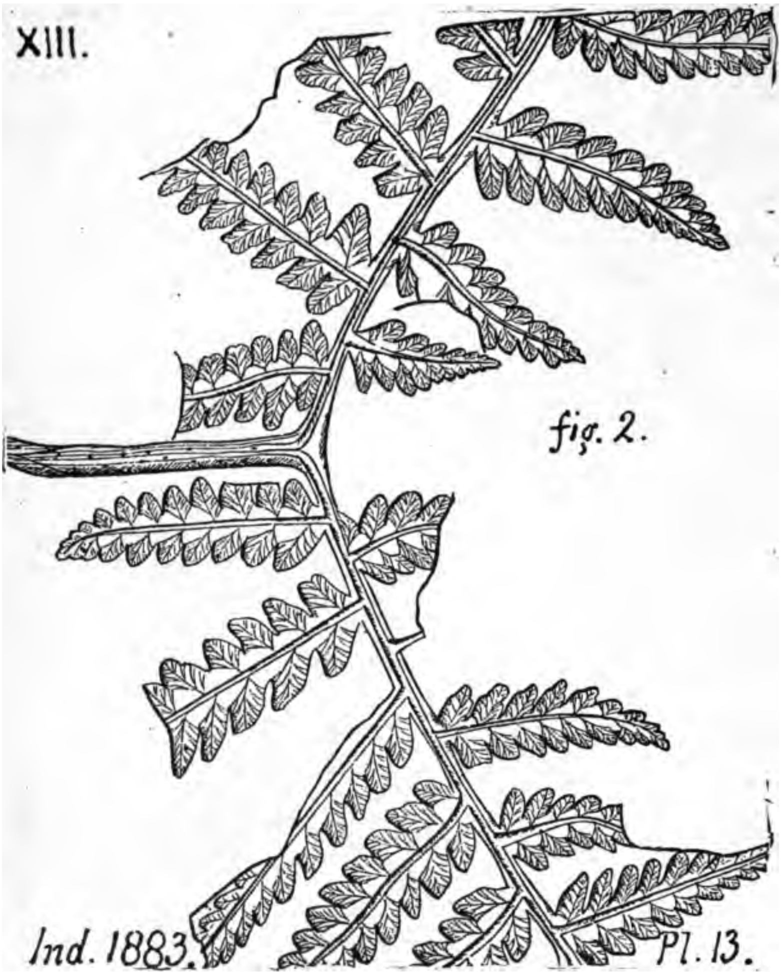
Pseudopecopteris nervosa, Lesq. (*Pecopteris nervosa*, Brgt.; *Alethopteris nervosa*, Geol. Pa., 1858, p. 865, pl. 18, fig. 3; Geol. Ill. Vol. 2, p. 442; *Pecopteris sauveurii*, Brgt.) Coal Flora, Vol. 1, p. 197, pl. 34, figs. 1, 2, 3. Abundant in the coal beds of the *Pottsville conglomerate* (Helena and Black veins), Alabama; also splendid specimens in Lacoe's cabinet at Pittston, Pa., found in black shale *base of conglomerate;* also at Oliphant. Rare in the coal at Cannelton, Beaver Co., Pa., and rare in the low Illinois Murphysborough coal. Found by I. C. White in the Cook (Fulton) coal roof at Old Barnet mine, Broad Top, Huntingdon Co., Pa. (T3, 315). Recognized by Lacoe in Koch's collections from coal shales at Tipton Run mines, Blair Co., Pa. (1889), which I assign to the *Pocono formation*. *X, XI, XII, XIII.* (*See figure under Alethopteris nervosa above.*)

Pseudopecopteris newberryi, (*Sphenopteris newberryi*, Lesq. Geol. Pa., 1858, p. 862, pl. 9, f. 4; found by a miner in the "upper red ash vein somewhere about Summit mine east end of South Anthracite basin, Pa. Very remarkable for its peculiar mode of branching; of as doubtful relationship as is *S. lesquereuxii;* Probably the same as *Pecopteris newberryi;* Lesq. Geol. Illinois, Vol. 2, p. 443; small specimen at Mazon Creek. Also specimen from Wilkes Barre in Mus. C. Zool. Cambridge, Mass.; also Oliphant Vein No. 1. *XIII.*

(**Pseudopecopteris newberryi**, *continued.*)

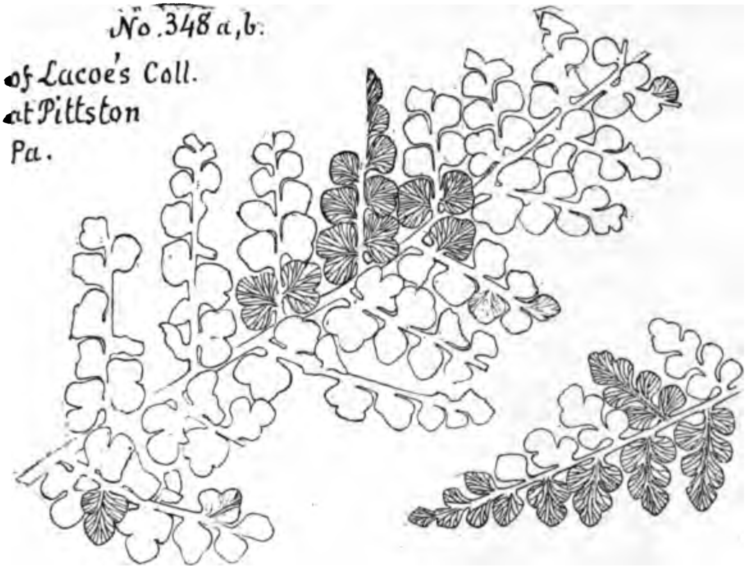


Pseudopecopteris newberryi. (*Sphenopteris newberryi*,


XIII.
fig. 2.
Ind. 1883.
Pl. 13.

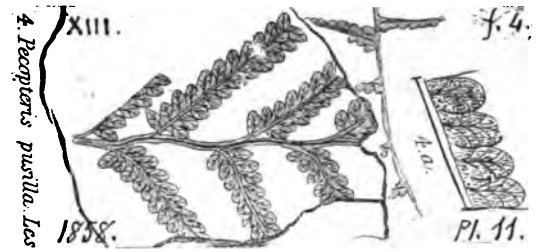
Lesq. Boston Journ. S. N. H. Geol. Pa., 1858, plate 9, f. 4. *Pecopteris newberryi*, Illinois Report, Vol. 2, p. 448.) Coal Flora, 1880, page 202, plate 37, fig. 1. First found in Summit mine in Mammoth Anthracite Vein, Mauch Chunk, Pa.; one from Wilkes-Barre; small one from Mazon Creek, Ill.; others from Mansfield's Kittanning coal at Cannelton, W. Pennsylvania. Lesq. Collett's Ind. Rt. 1883, plate 13, fig. 2. *XIII.*

Pseudopecopteris nummularia, found by Mr. Lacoe under Campbell's Ledge, Pittston, Pa. (G7, 39).—*XII.*


No. 348 a, b.
of Lacoe's Coll.
at Pittston
Pa.

Pseudopecopteris obtusiloba, (*Sphenopteris obtusiloba,* Brngt.) Lesq. G. B. Simpson's drawing (1889) of specimens Nos. 348*a*, *b*, in Mr. Lacoe's collection at Pittston.—Coal Flora, page 753, 754, 755. Locally abundant, especially in the *Sub-conglomerate coal measures* (*Pocono, X?*); extremely variable; one variety *Sphenopteris dilatata* Ll. and Hutt. (Lesq.) Wyoming mines, W. Va. and Clinton, Mo.—*X? XII?*

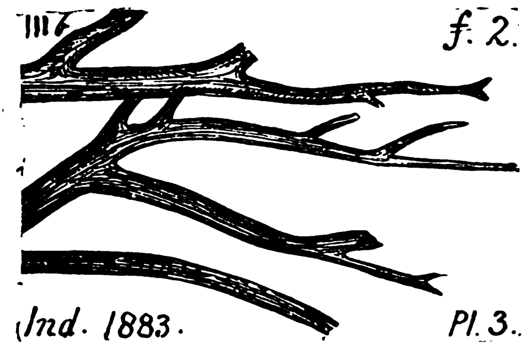
Pseudopecopteris pusilla. *Pecopteris pusilla,* Lesq. Geol. Sur. Pa. 1858, p. 866, pl. XI, f. 4, 4*a*.) Coal Flora, 1880, p. 220. A unique little specimen from the Salem Vein at Pottsville. Its leaflets are hairy, as in *Pecopteris villosa;* but the stalk (rachis) is smooth. "Except for the winged rachis and villous (hairy) surface, I should have taken this as a variety of *Pecopteris arborescens.*" Lesq.—*XIII.*



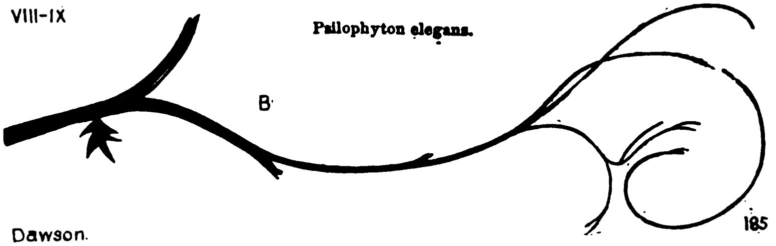
udopecopteris sillimani. Lesq. (*Pecopteris silli-* i, Bgt.) Geol. Ill. IV, p. 401) Coal Flora, p. 206, pl. 37, 3; under Campbell's Ledge conglomerate, Pittston, Pa.; ou Creek nodules, Illinois; also by White at bottom of relton shales, over coal B, Broad Top, Pa. (T3, p. 62) *XII, II.* NOTE. Lesquereux said in Ill. Rt., 1870, that it is one the rarest species in American coal measures.

Pseudopecopteris speciosa, Lesq. Coal Flora, page 216, ate 51, fig. 1, a fine species closely related to *P. latifolia* and *P. acuta*, of Brongniart, and to *P. nervosa*, Brongt., but differ-ng from all three by its large leaflets; found in the *Alabama low coal* at Helena.—Recognized doubtfully by Lacoe in Koch's collections (July, 1889), at the Tipton Run mines, Blair Co. Pa. from a bed assiged by me to the *Pocono formation.—X? XII.*

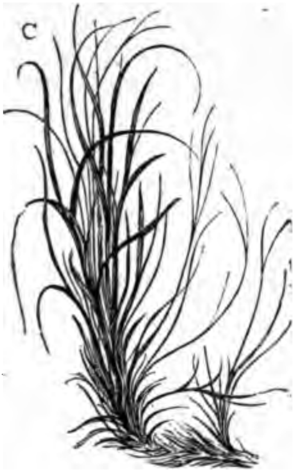
Psilophyton cornutum Lesquereux. Proceedings of the American Philosophical Society, Philadelphia, 1877. Collett's Indiana Report of 1883, page 78, plate 3, fig. 2, *Lower Helderberg sandstone* of Michigan; fragments also in *Upper Silurian strata* in Canada.—*VI.*


f. 2
Ind. 1883.
Pl. 3.

Psilophyton elegans, Dawson. Acad. Geol, 1868, page



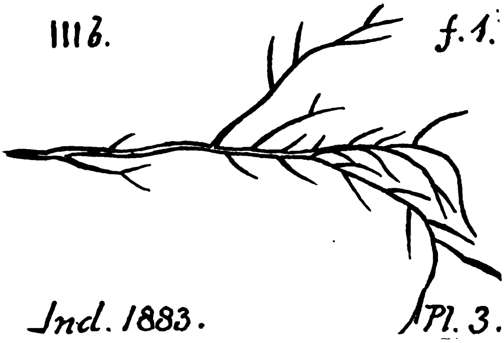
185 B; surface smooth with very delicate wrinkles: of small, broadly oval scales, borne on



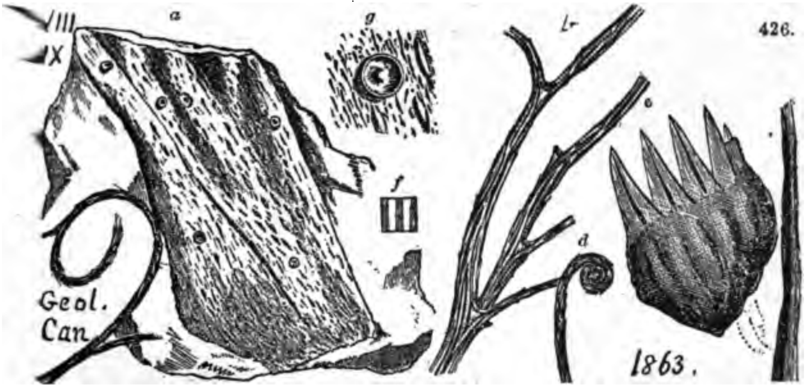
the main stem below the points of bifurcation, Smoother and smaller than *P. princeps*, growing in tufts, and with different form of organs of reproduction, yet not easily distinguished from it when fragmentary. *Devonian* of New Brunswick, Canada. *VIII–IX.*

Psilophyton elegans. Dawson. Geological history of plants, 1888, page 66, fig. 21*c*.—*Erian* (Devonian) rocks. *VIII.*

Psilophyton gracillimum. (Lesquereux. Proceedings American Philosophical Society, Philadelphia, 1877. Collett's Indiana Report of 1883, page 78, plate 3, fig. 1. In *Cincinnati* (*Hudson river*) *formation*, with fragments of branches (*Psilophyta; Lepidodendra*, or *Sigillariæ*). Collett. *III b.*

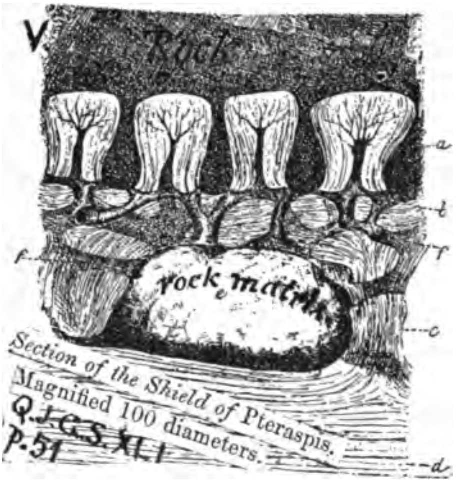

III b.
f. 1.
Ind. 1883.
Pl. 3.

Psilophyton princeps, Dawson. Geol. Canada, 1863, page 426.



397, figs. 426 *a*, a rhizome of this Devonian plant of the *Gaspe sandstone formation* in New Brunswick; *b*, twig; *c*, end of a branch; *d*, venation; *e*, fructification; long section of twig; (all the above of *natural size*); *g*, *magnified* areole of rhizome; *h*, omitted, given in another cut.—*VIII-IX.*—I. C. White reports it (doubtfully) in a *Chemung bed*, 1,750 feet above the top of the *Genesee*, in his Danville section, Montour Co., Pa., (G7, p, 307).—*VIII-IX.*

Pteraspis. The internal structure of the shield of this English genus of Lower Devonian fishes (*magnified a hundred times linear*) is shown by a figure from page 51 of the Quar. Jour. of the London Geological Society, to illustrate Prof. Claypole's description of **Palæaspis americana**, and **Palæaspis bitruncata.**



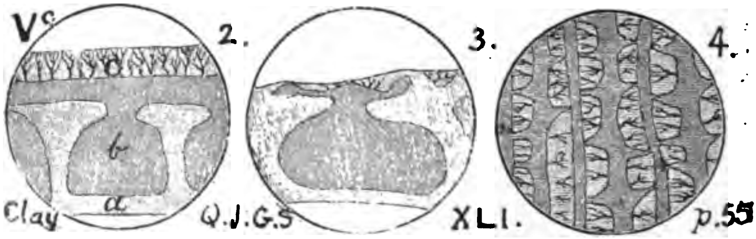


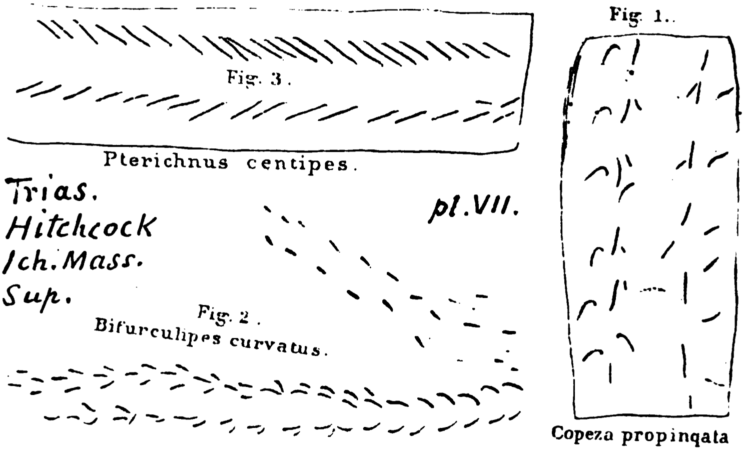
Fig. 2. Vertical longitudinal section showing (*a*) basal layer; (*b*) cellular layer; (*c*) vascular layer, (¹) lower portion, (²) upper or tubular portion.

Fig. 3. Vertical transverse section, showing (*a*) basal layer (*b*) cellular layer; (*c*) vascular layer, (¹) lower, (²) upper portion.

Fig. 4. Horizontal section through vascular layer of shield

showing the lower branching vessels, the upper vessels or channels, and the tubules (seen from below).

Pterichnus centipes, *Acanthicnus tardigradus*), Hitchcock. Sup. to Ich. Mass. 1865, page 14, plate 7, fig. 3, the trail of some centepede or myriopod which lived with the gigantic frog-like, lizard-like, and bird-lizard or bird-like animals of the Connecticut river red-shale and sandstone, and walked on the soft muddy shore of the estuary. In the Ichthyology Mass., 1858, Hitchcock described it as perhaps an insect (crustacean) moving by leaps rather than like the hairy or many-legged worms. (I copy also two other myriopod tracks, *Bifurculipes curvatus* (going and coming), and *Copeza propinquis* (*propinquata*) *Lithographus hieroglyphicus*, Hitch.)—*Trias*.)



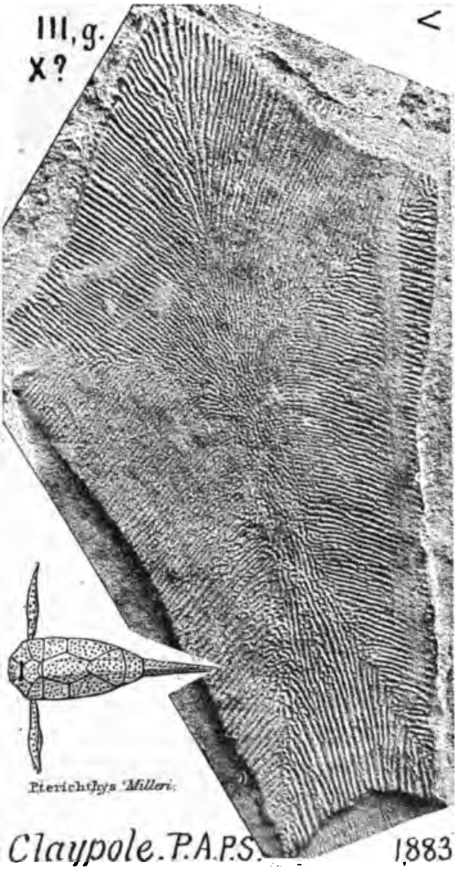
Trias.
Hitchcock
Ich. Mass.
Sup.

pl. VII.

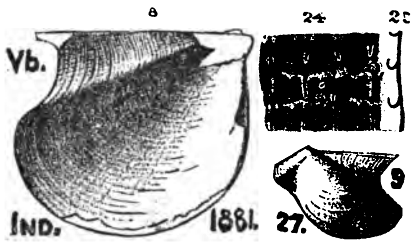
Pterichthys milleri, Agassiz, figure from Pander, in Owens' Palæontology, 1860, p. 119, 1861, p. 142, the dorsal surface of this winged fish discovered by Hugh Miller in 1833, in the *Old Red Sandstone formation* of Scotland, described by him in 1840 (Proc. Geol. Sect. British Association at Glasgow); wearing a great buckler or backplate, and a breast plate, jointed together at the sides; the hinder part and tail defended by a chain-armour of small enameled (ganoid) scales; one small dorsal fin (*d*); two armored pectoral fins, enabling the fish "to shuffle along the sandy-seabed if left dry at low water."

en). — See Prof. E. D. Cope's remarks in American Natur-
, Dec., 1886.—*IX*. (*See figure on page 809.*)

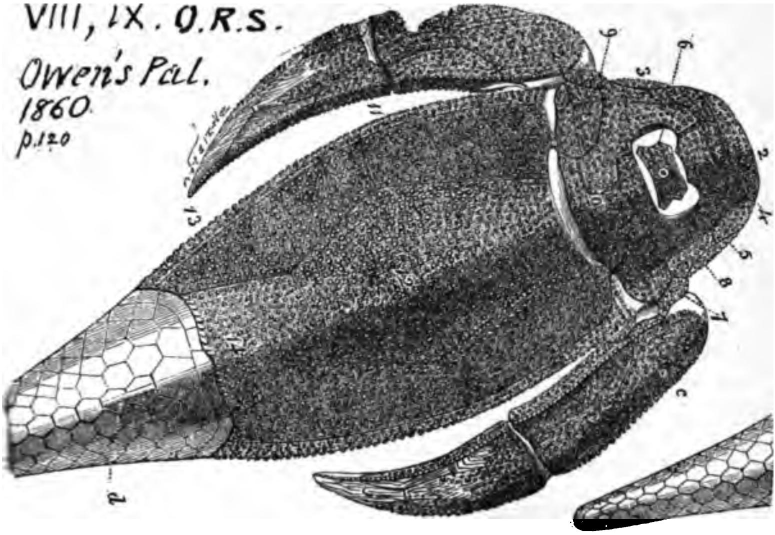
?terichthys ? *rugosus*. Claypole. This fine fish-plate was found by Mr. Carter in Susquehanna Co., Pa., and referred by Prof. Claypole to Dr. Newberry, who had fragments which might belong to the same species. Prof. Whiteaves of the Canadian survey also considered it undescribed; its nearest resemblance being to one of the back plates of the European Pterichthys, but is too flat. I may be a belly plate.—*VIII g*, Chemung, or more probably *VIII-IX*, passage beds into Catskill formation, or lower Catskill, equivalent to the British Old Red Sandstone. (Note. Figure from photograph from plaster cast A small figure of *Pterichthy's milleri* from Salte & Davidson's chart added for illustration.)



Pterinea brisa, Hall. Fig. from Collett's Indiana Re of 1881, page 316, plat figs. 24, 25, Plate 28, f to 9.



(**Pterichthys milleri.** *See page 807.*)



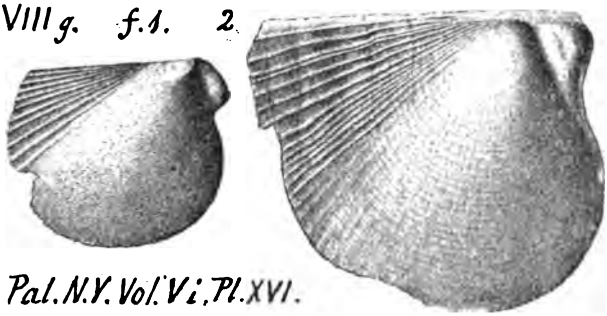
VIII, IX. O.R.S.
Owen's Pal.
1860
p.120

Pterinea cardiiformis. See **Megambonia cardiiformis.**

Pterinea chemungensis, Conrad. Figure wrongly placed on page 75 under *Aviculopecten pecteniformis.* Hall, Pal. N. Y., V., 1, plate 16, fig. 10. (R. P. Whitfield's corrections of Jan., 1889.)—Recognized in Pennsylvania, by C. E. Hall, among Carll's specimens from *Upper Chemung.* Also 872-42, OOO, from Tioga Co., N. Y. *Chemung. VIII g.*

Pterinea consimilis, Hall. Pal. N. Y., Vol. 5, plate 16, figs. 1, 2. In special cabinet, Geol. Sur. Pa. (Cat. OOO, p. 241,) spec. 872-50 *b*, Spec. 883-86 *b* (upper part gone); 883-93 *b*; all at Nichols, Tioga Co., N. Y.—*Chemung, VIII g.*

VIII g. f.1. 2

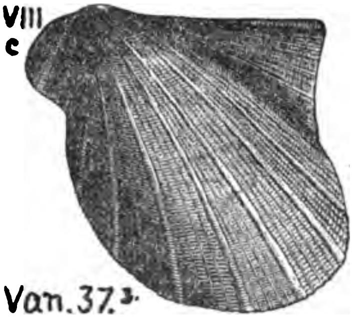


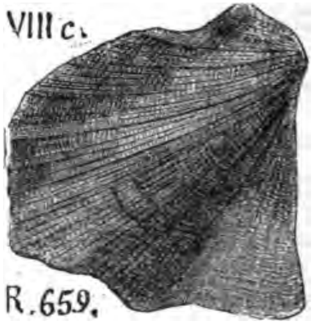
Pal. N.Y. Vol. V i, Pl. XVI.

Pterinea demissa. Improperly named ***Avicula demissa*** on page 68 of this Dictionary. (R. P. Whitfield's corrections, Jan., 1889.)—see also, Pal. Ohio, Vol. 2, 1875, page 78, plate 2, 1875, page 78, plate 2, fig. 1, left valve, slightly restored on the rear wing, not uncommon in the Upper ***Hudson River*** beds at Cincinnati, O., and probably to be found at all outcrops of the formation, as it has been seen in so many distant localities. *III b.*

Pterinea emacerata, quoted by C. E. Hall, among his collections in Ferguson's and Aughwick Valleys, Huntingdon Co., Pa. (MS. Rt. 1875); and by White (T3, 141) as in the 133′ of *Clinton* shales, over the ore bed, at Orbisonia. *V a.*—Probably **Avicula emacerata,** Conrad, Jour. Acad. Nat. Sci., Phila., 1842, figured in this Dictionary, p. 68.—*V a, b.*

Pterinea flabellum. (*Avicula flabella.* Conrad, Jour. A. N. S., Phila., Vol. VIII, 1842.) Vanuxem, Geol. N. Y., 1842, page 152, fig. 37, 3. Rogers, Geol. Pa., 1858, page 827, fig. 659. *Upper Helderberg*, *VIII a*, and *Hamilton*, *VIII c.*—In Penna., Huntingdon Co., found by White in Cove Station RR. cut, in bottom beds of *Hamilton middle* shales.

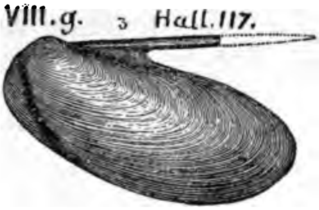




See OOO, Spec. 803–6,–7,–8 (internal mold of right valve), 803–9,–18 (frag.),–19 (impr.),–21 (imp. of frg.),–23 (frag.) all from Saddleback ridge, near Orbisonia; also in Monroe Co., Marshall's creek. Spec. 804–35 (very poor bit),–67 (poor bit), from *Hamilton* beds; also west of Marshall's falls, Spec. 807–2 (fragment),–7,–20 (impression). also in Tioga Co., at Lawrenceville. Spec. 850–4 (imp.),–10 (poor.) called by Sherwood *Chemung beds.* If so it ranges from *VIIIa* up to *VIII g.*

Pterinea gibbosa. See **Monopteria gibbosa.**—XIII.

Pterinea longispina, (*Avicula longispina,*) Hall, Geol., Fourth District, N. Y., 1843, page 262, fig. 117, 3. *Hamilton* and *Chemung formations. VIII c, g.*


VIII.g.
3
Hall.117.

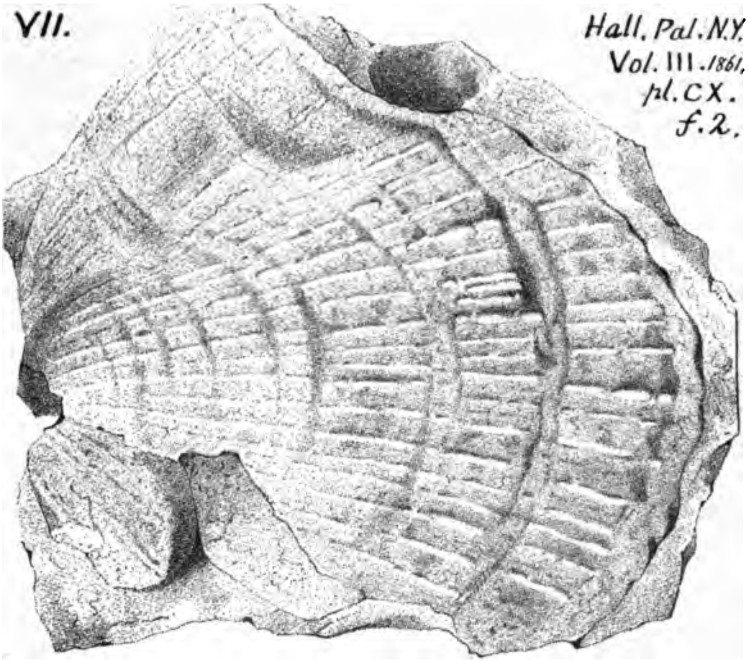
Pterinea orbicularis. See **Ambonychia orbicularis.** *II, c.*

Pterinea rugosa, wrongly called *Avicula rugosa*, on page 69, above. (R. P. Whitfield's corrections, Jan., 1889.)

Pterinea suborbicularis. See **Aviculopecten.** *VIII g.*

Pterinea subplana? Wrongly called *Avicula subplana*, Rogers, on page 70, above. (R. P. Whitfield.)

Pterinea textilis, quoted by C. E. Hall. (MS. Rt. 1875) and I. C. White (T3, 119) as found in Huntingdon Co., Pa., at RR.



cut in Three Springs, at end of Royer's ridge, and at end of Sandy ridge, Orbisonia, all in *Oriskany*, *SS. VII.* Also, by White as found south of Carpenter's Point on the Delaware (G6, 123) in *Oriskany shale;* and in *Stormville shale* and *limestone* (132, 134), *Lower Helderberg.*— *VI*, *VII.*—This is no doubt **Avicula textilis**, var. **arenaria**, Hall, Pal. N. Y., Vol. 3, 1861, p. 465, pl. 110, f. 2, which is named, but not figured on p. 70 of this Dictionary above.

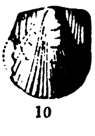
Pterinea undata. See **Ambonychla undata.** *II c.*

Pterinea —— ? Conrad's fig. 4, on page 68 of this Dictionary, above, is improperly called *Avicula emacerata.* (R. P. W.)

Pterinea —— ? Rogers' figure 617 on page 69 above is wrongly placed with Emmon's fig. of *Avicula insueta.* (R. P. W.)

Pterinea —— ? Broad-winged and of *Hamilton* aspect, is the only fossil form discovered in the *Marcellus limestone beds* of Bedford and Fulton counties, Pa. (J. J. Stevenson, T2, p. 84), *VIII b.* In Perry Co. at New Bank tavern, south of New Bloomfield, Claypole obtained two *Pterineas* (spec. 115–5) from *Chemung lower beds.* In Huntingdon Co., on Shy Beaver creek, *Pterineas* are numerous in the lowest 70′ of the 300′ sandy shales under the *Chemung lower* (*Allegrippus*) *conglomerate.* In Bedford Co., north of Leroy, Spec. 70–10 came from *Chemung* strata. From the *Chemung* beds on the river opposite Bloomsburg, Columbia Co., came Spec. (OOO) 2150. In Lawrence Co., White's Wapwallopen section, along the river above Berwick, the *Chemung beds*, No. 41 (400′ thick) have *Pterinea*, *Nucula*, *Nuculana*, *Spirifera*, *Leiorhynchus*, and many other fossil forms scattered through them. (G7, p. 197.) All the above are *VIII g.*—In McKean Co. Wilcox hill, west of depot *Pterinea*, *Strophomena*, and *Orthoceras* appear on Spec. (O) 3285 from *Pocono sandstone*, X.—In Crawford Co. *Pteriena* and many other *Chemung shells* may be got, at the Meadville iron bridge, from the *Cussewago sandstone.* (Q4, 165).—*X.*

Pterinopecten ? atticus. H. S. Williams, [Bulletin No. 41, 1887, U. S. Geological Survey, page 35, plate 3, figs. 10, 11, *enlarged twice*, right and left valves, from the *Portage shales*, Attica, N. Y.—*VIII f.*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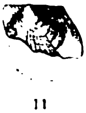
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Pterinopecten suborbicularis, Hall, Pal. N. Y. V i, plate 8; figure wrongly placed under **Aviculopecten suborbicularis,** page 77 of his dictionary. (R. P. Whitfield's corrections, Jan., 1889.) This species seems to be represented by specimen 861–21 of collections of catalogue OOO, 1889.

Pterinopecten —— ? Undeterminable species noticed by Heilprin among the anthracite black shale fossils from near Wilkes-Barre, in the cabinet of the Wyoming Hist. Soc. Geol. Sur. Pa. An. Rt. 1885, p. 451. *XIII.*

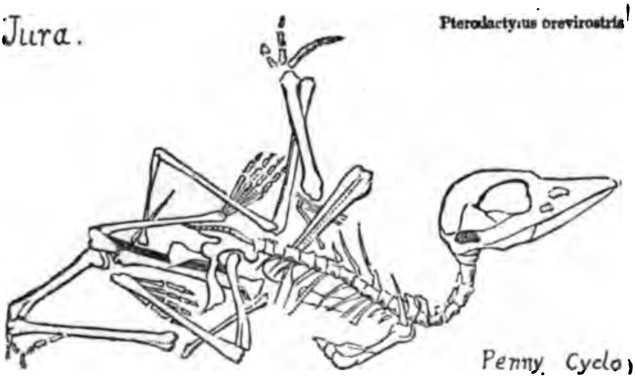
Pterinopecten —— ? Spec. 852–5 (umbo and wings; a greater portion of the shell destroyed).

Pterocephalia laticeps, (*Conocephalites laticeps.*) Hall and Whitfield, Fortieth Parallel, Vol. 4, 1877. *Potsdam sandstone*, *I.* (S. A. Miller.)

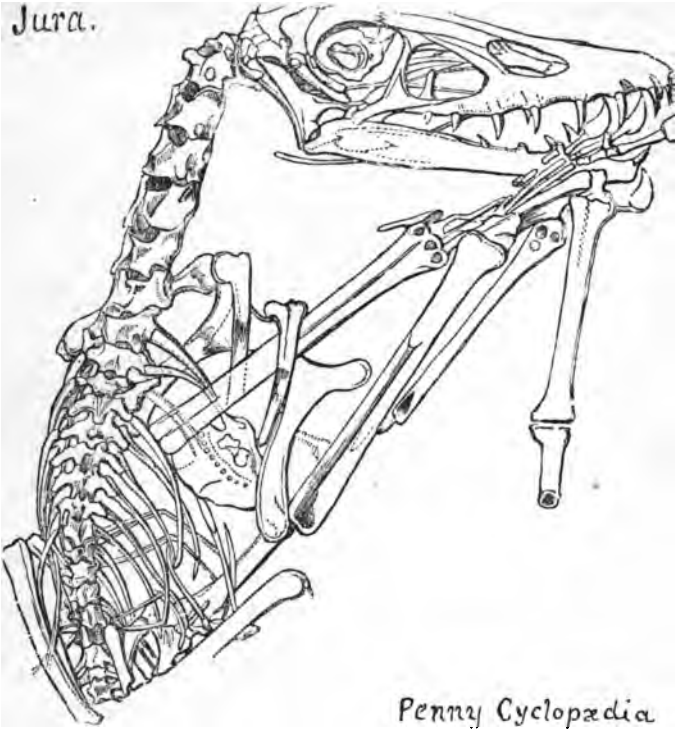
Pterocephalia occidens. Walcott. Mon. U. S. Sur. Vol. 8, 1884. *Potsdam group*, *I.* (S. A. Miller.)

Pterocephalia sanctisabæ. Roemer. Texas, &c, 1849; and Kreide von Texas, 1852, p. 92. *Potsdam group*, *I.* (This genus of "wing-headed" trilobites is described from this species as a type, in S. A. Miller's N. A. Geol. and Pal. 1889, p. 564.)

Pterodactylus brevirostris, Cuvier. One of the species of the remarkable flying lizards found in the *Solenhofen lithographic stone* quarries of Europe. Figure taken from the Penny Cyclopedia. (It was originally described and named *Ornithocephalus brevirostris*, by Sommering; and afterwards *Pterodactylus nettecephaloides* by Ritgen.) No species of this family has yet been found in America.—*Middle Jurassic.*



Pterodactylus crassirostris, Goldfuss. Another sp



of flying lizard found at Solenhofen in Germany in the *dle Jurassic.*

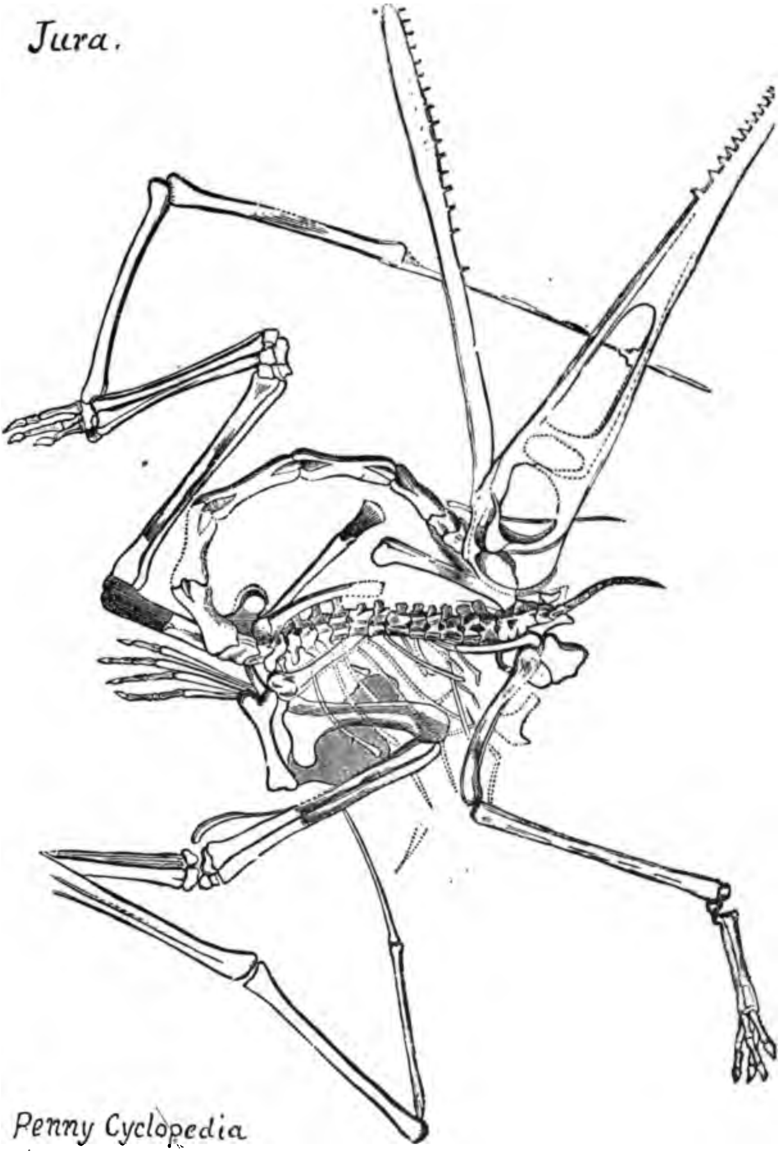
Pterodactylus longirostris. The specimen of fly ard found at Solenhofen which most clearly displayed t tomy of the bat-like wing structure, the bird-like ne head, and the lizard-like teeth of this family. In Pe nia we may possibly have strata of *Middle Jurassic* ε if so, no evidence of the fact in the shape of lithograpl or Jurassic fossil forms has ever been observed. Tl is given in the Penny Cyclopedia, in a peculiarly sa style; much better than in the best Hand-books or M Geology.

Pteronitella curta. Billings, 1874. *VI.*

Pteronitella oblonga. Bill., 1874. *VI.*

Pteronitella venusta. Bill., 1874. *VI.*

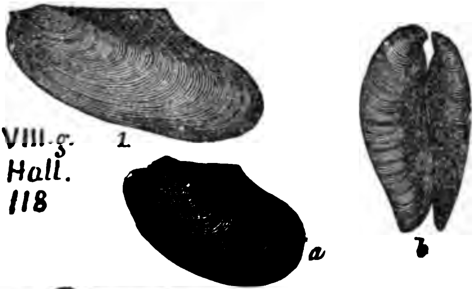
(Pterodactylus longirostris. *See page 814.*)

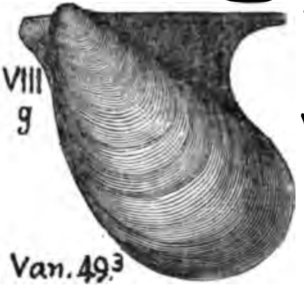


Jura.

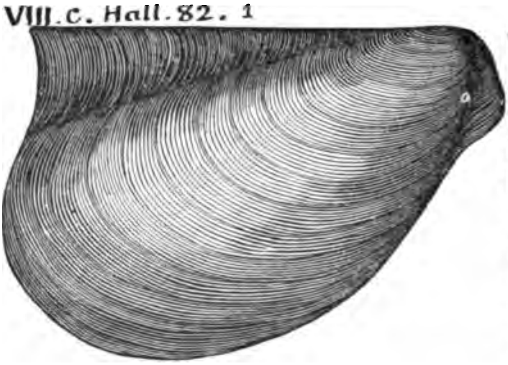
Penny Cyclopedia

Pteronites chemungensis. (*Avicula chcmungensis*, Vanuxem, Geol. N. Y. page 182, fig. 49. Rogers Geol. Pa., page 829, fig. 678. Hall Geol. N. Y., 1843, page 263, fig. 118, 1, a, b. (Compare *Avicula damnonensis* Sowerby. in Geolog. Trans. London [2] LIII, fig. 22.) *Chemung formation.*— In Huntingdon and Centre counties it is characteristic of the *Chemung* (T, 29; T4, 434), as, for instance, in sandy shales No. 44, 45, Pa. R. R., Juniata section below Huntingdon. (T3, 264.) In Columbia Co. the Rupert's Narrow's beds 41 (G7, 69, 70; Claypole's Cat. spec. 93–11, fine specimens). The Bloomsburg section bed 67 (G7, 287), and beds 7, 9 (G7, 290) yield it with *Chonetes setigerus*. and *Spirifera mesocostalis*, in the *Chemung proper*. But in the Catawissa section (G7, p. 238) it occurs with *Lingula spatulata*, in bed 25, 300 feet above the *Catskill Holoptychius fish-bed*, or 1300 above top of Chemung proper. *VIII g; XI.*

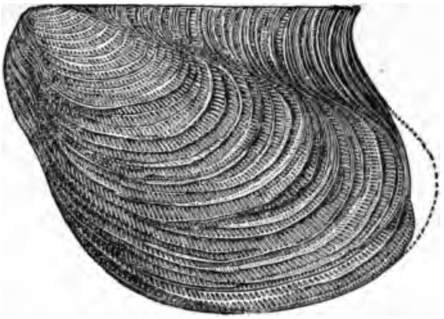




Pteronites decussatus. (*Avicula decussata.*) Hall. Geol. of Fourth District N. Y. 1843, page 203, fig. 82, 1 (a cast in limestone), fig. 82, 2 (a shell in shale.)



VIII.c. H.82.2.



Rogers, Geol. Pa. 1858, fig. 657. *Hamilton formation.* Reported by Ewing (T4, 434), as found in Centre Co., Pa., in the *Chemung formation.* Reported by White (G7, 76, 229) as found in *Columbia* Co. Pa., Hemlock township, 250′ below the top of the *Hamilton formation.* *VIII c; VIII g?*

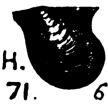
Pteronites gayensis, Dawson. Acadian Geology, 1868. page 301, fig. 101, surface covered with rounded concentric wrinkles. Found in the *Carboniferous limestone*, Nova Scotia. *XIII?*

XIII.

Pteronites lævis. (*Avicula lævis.*) Rogers' Geol. Pa., 1858, page 827, fig. 662. Hall, Geol. N. Y., 1843, page 180, figs. 71, 6, *Hamilton.* In Pennsylvania, Columbia Co., Hemlock township (G7, 76, 230) in black slate 20′ below top of *Marcellus.* In Huntingdon Co., between McConnellstown and RR. station, and at the 203d M. post, P. RR., below Huntingdon (T3, 113), in vast numbers at the top of the *Marcellus shales;* see specs. 191-1, 3, 203, 2, 3. At the Coffee run RR. quarry (p. 12) they lie in *Hamilton lower shales.* See spec. 190-6. *VIII b, c.*

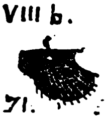
VIII c R. 662.

VIII.b. H. 71. 6.



Pteronites muricatus (*Avicula muricata.*) Hall. Geology of the Fourth District of New York, 1843, page 180, fig. 71, 5. *Marcellus formation.* *VIII b*

VIII b. 71.



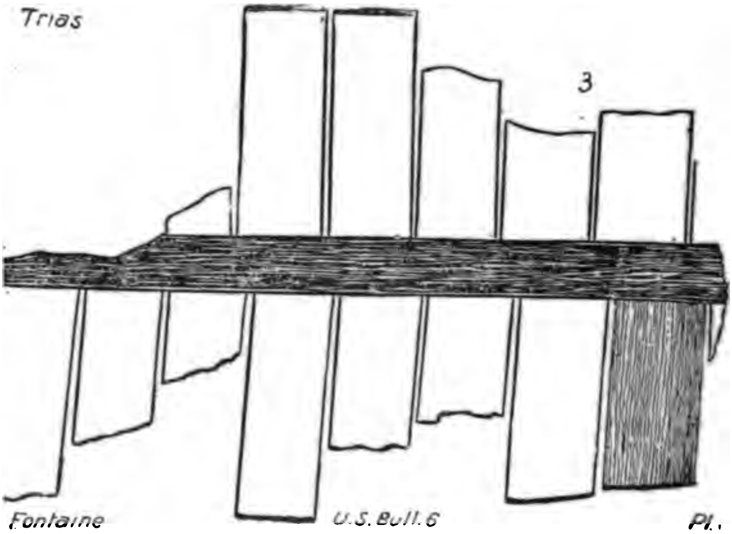
Pteronites spergenensis. Whitfield, Bulletin No. 3, of the American Museum of Natural History, N. Y., 1882. Collett's Indiana Report of 1882, plate 30, fig. 1, view of a left valve, *magnified twice*, from Spergen hill. Indiana. *Subcarboniferous. XI.*

XI. 1. Ind. 1882. Pl. 30

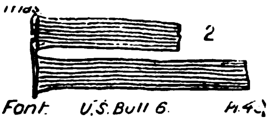
Pteronites spinigerus (*Avicola spinigera*). Hall, page 262, fig. 117, 4. (Conrad, Jour. Acad. Nat. Sci., Philada. Vol. 8, 1842, page 237, pl. lxii, fig. 3.) *Chemung. VIII g.*

Pteronites——? in *Hamilton sandstone*, Perry Co., Rambo's (Spec. 107–5); and in Huntingdon Co., Rough and Ready (Spec. 107–5).—*VIII c.*—In *Chemung shales*, Pike and Monroe Co. (G6, 105).—In *Chemung-Catskill*, *Panama* or *LeBœuf conglomerate*, the *Third Oil sand* of Erie Co., a *Pteronites* is both abundant and characteristic (Q4, 110, 249).—In the *First Oil Sand* in Crawford Co., there is a *Pteronites* of Chemung type (Q4, 102). In the Devonian strata, on the anticlinals in the gaps of the Conemaugh and Youghiogheny rivers in Fayette and Westmoreland, is a *Pteronites* (K3, 311).—*VIII c; VIII g; X?*

Pterophyllum affine, Nathorst. Fontaine's Monogr. U.



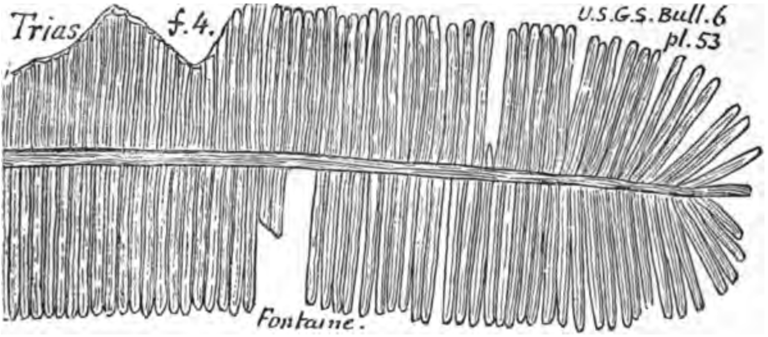
S. Geol. Sur. Vol. 6, 1883, page 66, plate 32, fig. 3, fragmer leaf with average sized leaflets. (Other figures show la and smaller leaflets.) Only difference from the Swedish j is that it sometimes grew to a larger size, and its leaflet closer. Resembles the Indian *P. rajmahalensis*, Morris, and the Sonora *P. delicatulum*, Newb. Found only at Midlothian, Va., and only a few specimens, all on one standstone slab.—*Trias.*



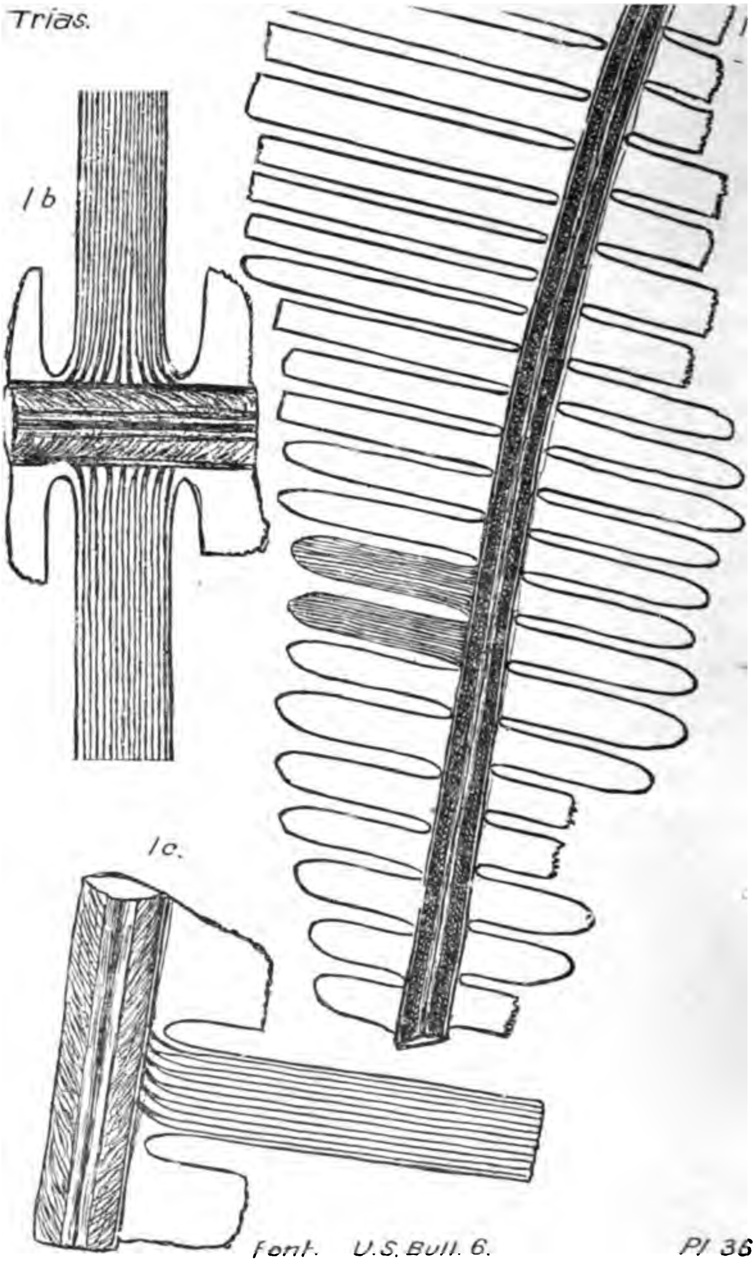
Pterophyllum decussatum, (*Pterozamites decussatus,* Emmons. Am. Geol. pl. 3, fig. 1.) Fontaine's Monogr. U. S. Geol. Sur. Vol. 6, 1883, page 67, plate 43, fig. 2, insertion of two leaflets, found as a small fragment in the Cumberland area in Virginia, in black shale of the horizon of the *Richmond coal beds.*—*Trias.*

Pterophyllum inæquale, Fontaine. Monog. U. S. Geol. Sur. Vol. 6, 1883, plate 36, fig. 1, normal leaf; 1*b magnified* leaflet from lower part; 1*c*, ditto from near summit of pinna. The sudden abbreviation of leaflets towards summit of leaf, and irregular intermingling of leaflets of different widths, are seen in no other *Pterophyllum* known to me. (Fontaine,) Midrib fleshy, with thick skin. Resembles the Swedish *Rhætic P. æquale*, Nathorst; and the German *Lower Lias P. longifolium*, Andrae; a good deal like Heer's *Triassic P. longifolium*, Brongt.; also Emmons' *Pterozamites decussatus.* Only two specimens found, on one slab, upper small coal bed series, Clover Hill, Va.—*Trias.* (*See figure on page 820.*)

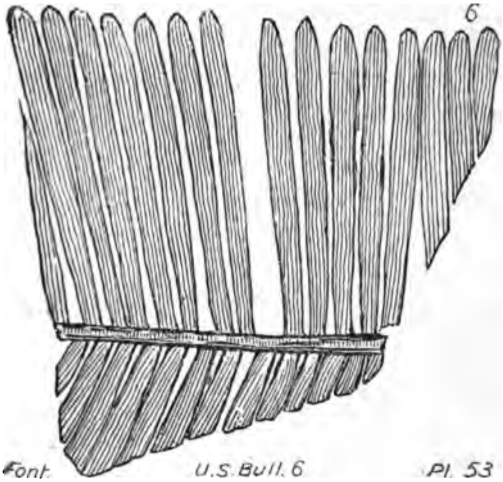
Pterophyllum pectinatum, (*Pterozamites pectinatus,* Emmons, page 117, fig. 84) Fontaine. Monograph U. S. Geol. Sur. Vol. 6, 1883, p. 112, plate 53, fig. 4. Very like the German *Wealden P. lyellianum*, Dunker.—N. C. *Trias.*



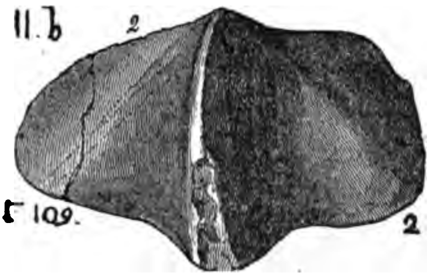
(**Pterophyllum inæquale.** ***See page 819.***)



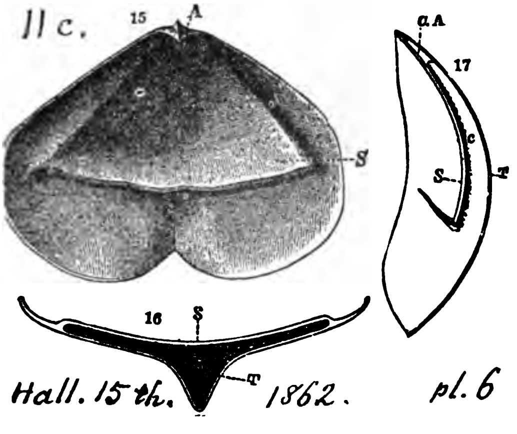
Pterophyllum spatulatum, (*Pterozamites spatulatus*, Emmons. American Geology, fig. 88.) Fontaine, Monograph U. S. Geological Survey, Vol. 6, page 114, plate 53, fig. 6, a N. Carolina form, between which and the Virginian *P. inæquale*, stands the German *Liassic P. andraeanum*, Schimper (*P. longifolium* Andræ) in a transitional series.—*Trias.*



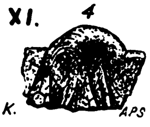
Pterotheca expansa (*Delthyris expansa ;* so called because supposed to be a brachiopod; it was on the contrary a pteropod shell.) Emmons, page 397, fig. 109, 2. *Black River* and *Trenton formations. II c.*

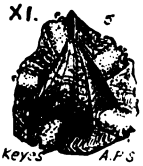


Pterotheca (*Clioderma*) **saffordi,** Hall. 14th An. Rt. 1861, p. 96. 15th Annual Report,1862, plate 8, figs. 15, interior view, showing broad septum; 16, cross section, showing form and extent of internal cavity; 18, lengthwise section, with outline of margin. *Trenton formation*, *II c.*

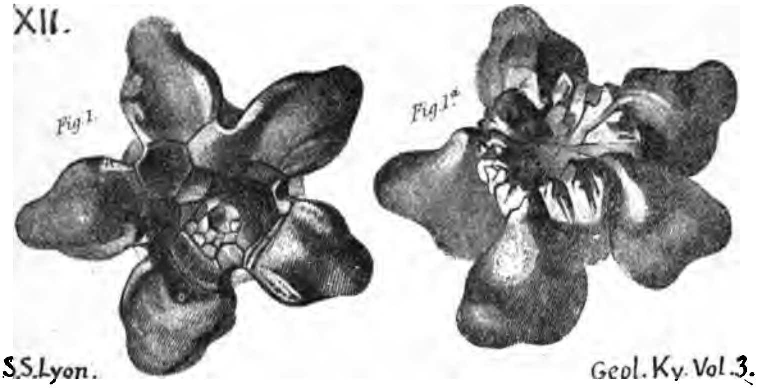


Pterotocrinus acutus, Keyes. Amer. Philos. Soc. Phila., Vol. 25. No. 128, page 242, fig. 4, growing on *Platyceras chesterense*; fig. 5, growing on another *P. chesterense*. *Subcarboniferous limestone.* *XI.*



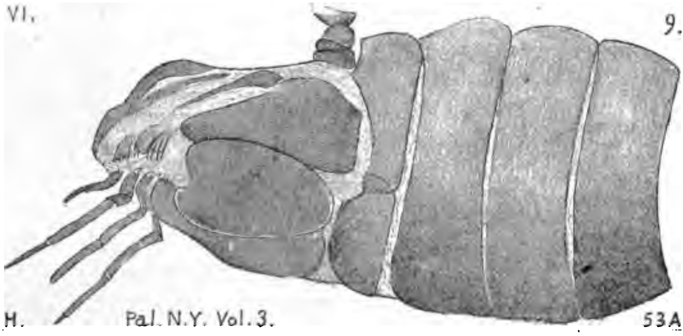


Pterotocrinus (*Asterocrinus*) **coronarius**, Lyon, Geol. Survey, Ky., Vol. 3, 1857, page 476, plate 1, fig. 1, view of the summit; 1*a*, base, *natural size.* Found in the lower lime-shale beds of the *Millstone grit* of Crittenden Co., Ky.


XII.
Fig 1.
Fig 1a.
S.S.Lyon.
Geol. Ky. Vol. 3.

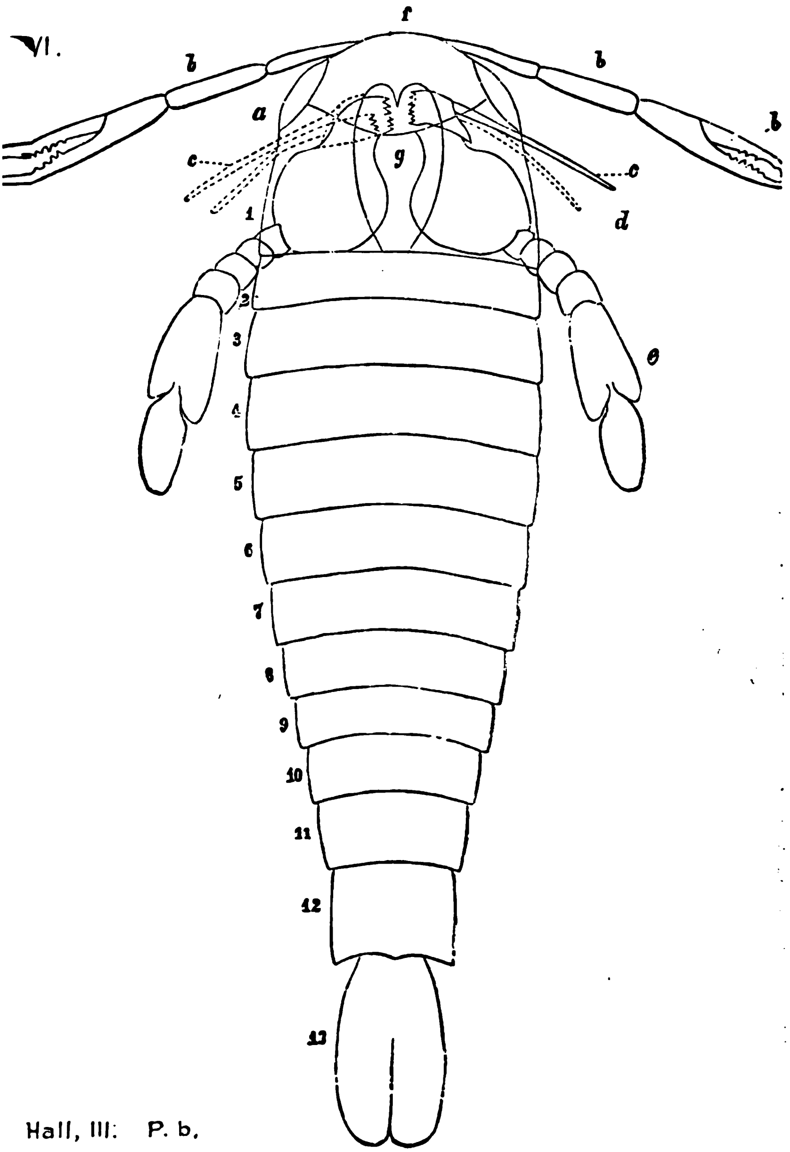
Pterygotus bilobus. Hall. Pal. N. Y., III, p. 424. L. Held.—VI. (*For figure see page 823.*)

Pterygotus osborni, Hall. Pal. N. Y., Vol. 3, 1859, p. 419, plate 53 A, fig. 9. *Water lime.* A good specimen was



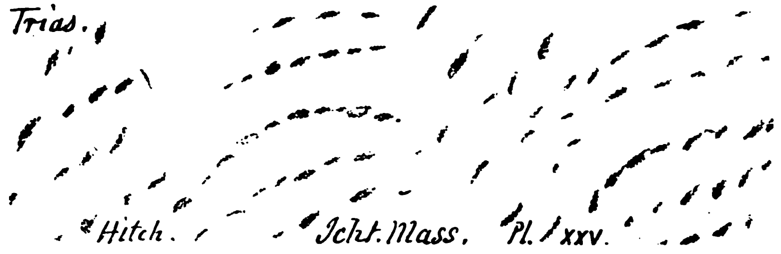
(Pterygotus bilobus. *See page 822.)*

VI.



Hall, III: P. b.

found in Juniata Co., Pa., in the water lime beds of *Lower Helderberg formation*, by Claypole, F 2, preface.— *VI.*

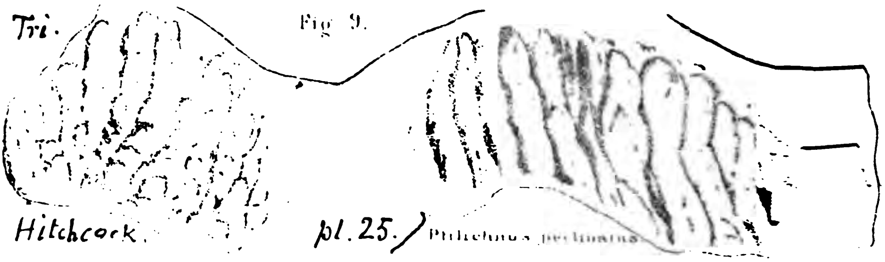


Trias.

Hitch. Ichth. Mass. Pl. xxv.

Ptilichnus anomalus, Hitchcock Ichthyology Mass., 1858, page 145, plate 25, fig. 1 (only a third of it) here given to show the very peculiar mode of progression of the unknown creature, perhaps a fish, either in very shallow water or on the wet muddy shore of the ancient estuary of the Connecticut river valley. (Living fish of the genus *Calichthys*, at Surinam, will move pretty freely over a dry floor, using their fins as legs. J. Wyman.) Turner's Falls, Mass. *Trias.*

Ptilichnus hydrodromus, Hitch. (*Ichthyopodolites*, Burkland, Phil. Mag. 1844.) Ich. Mass. 1858, p. 146, pl. 26, fig. 5 *Trias.*



Tri.

Hitchcock. pl. 25.

Ptilichnus pectinatus, Hitch. Ich. Mass., 1858, page, 146, pl. 25, fig. 9, doubtfully considered an animal track, perhaps merely the effects of water motion. (Hitchcock). Turner's Falls, Mass. *Trias.*

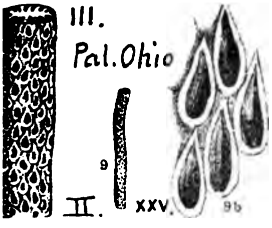
Ptilocarpus bicornutus. See **Cardiocarpus bicornutus.** *XIII.*

IIc.

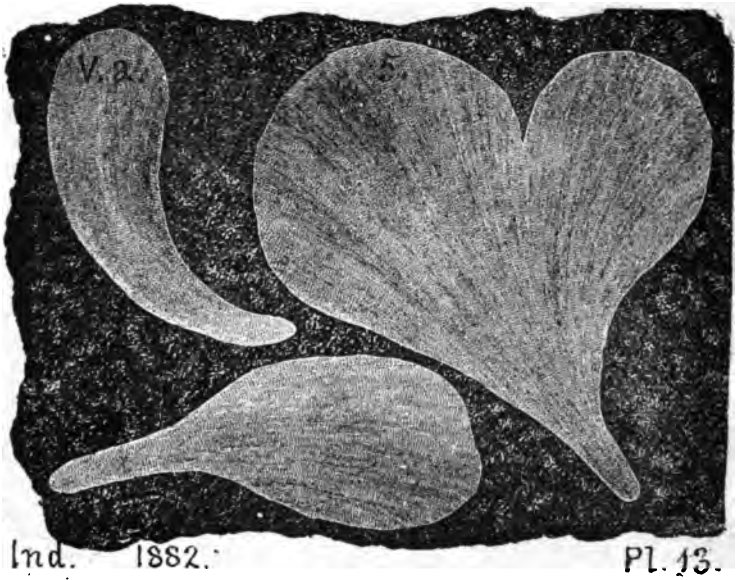
Geol. Canada

Ptilodictya acuta, Hall. Geology of Canada, 1863, page 158, fig. 121, from the *Trenton limestone formation. II c.*

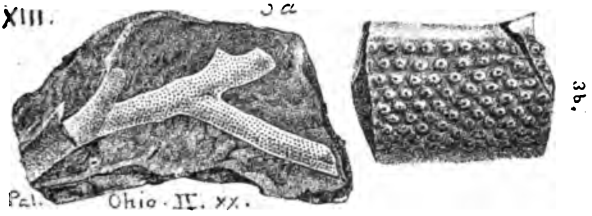
Ptilodictya (?) arctipora, Nicholson. Pal. Ohio, Vol. 2, 1875, page 262, plate 25, fig. 9, *natural size*, fragment of cylindrical frond; 9*a*, *enlarged* portion of it; 9*b*, *greatly magnified* cells; but as these specimens collected have no laminar axis, nor porous edges, this minute organism (certainly not a *Ptylodictya*) cannot be classed; it has some affinity to Hall's *Clinton P.* (*?*) *raripora.—Hudson river strata* at Cincinnati. *III b.*

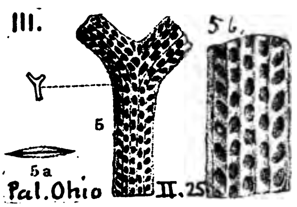


Ptilodictya bipunctata, VanCleve in Collett's Indiana Report of 1882, page 266, plate 13, fig. 5. Three entire bryozoon-fronds on one specimen of the *Dayton limestone* of Ohio, considered there to represent the *Clinton formation. Va.*


V.a.
5
Ind. 1882.
Pl. 13.

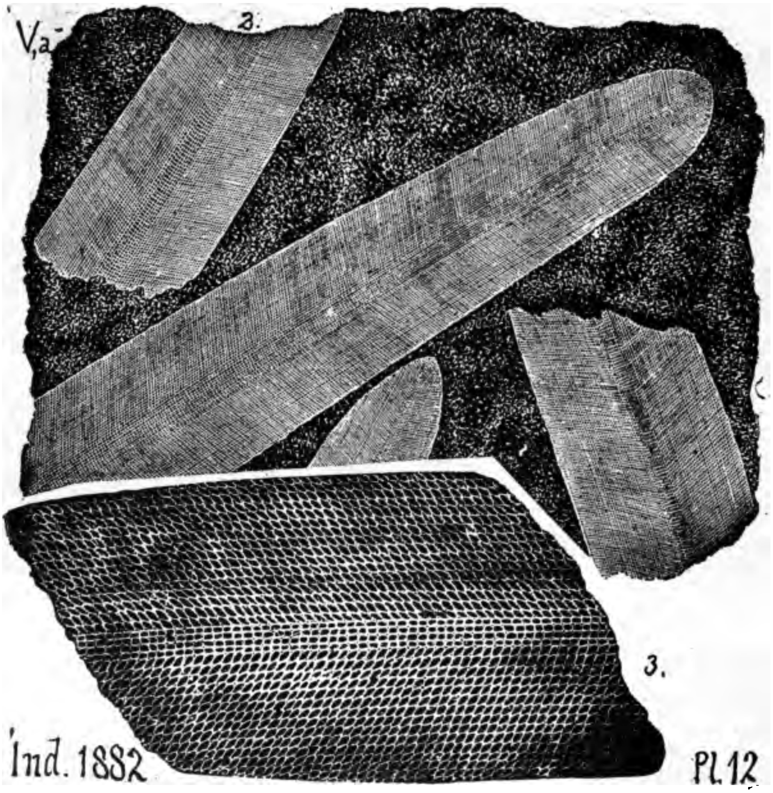
Ptilodictya carbonaria. See **Stictopora carbonaria.** *XIII.*



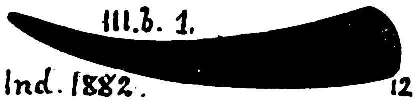


Ptilodictya emacerata, Nicholson, Pal. Ohio, Vol. 2, 1875, page 261, plate 25, fig. 5, *natural size* and *enlarged* fragment; 5*a*, *enlarged* cross section; 5*b*, *much magnified;* from *Hudson river strata* at Cincinnati, O. Differs from *P. fragilis*, Billings, from Anticosti rocks of about the same age, by its uniform littleness, fewer rows of cells in a frond, and only one row of oblique cells on each side; perhaps it is only a variety. *III b*

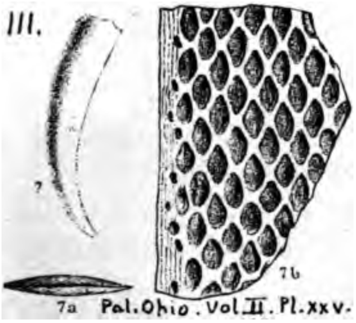
Ptilodictya expansa. (See **Phænopora expansa**, Hall and Whitfield, Pal. Ohio, Vol. 2, p. 114, 1875. *Flustra lanceolata*, Goldfuss, quoted by VanCleve MSS., 1853.) Collett's Indiana Report, 1882, page 266, plate 12, fig. 2 (VanCleve) four fronds of the bryozoon on one specimen; fig. 3, a part of one



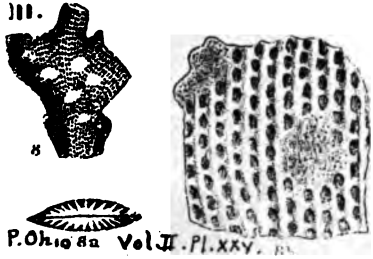
Frond *magnified* to show structure. *Dayton yellow limestone formation.* (Possibly *Niagara.* Collett.) *V a.* (*V b?*)


III.b. 1.
Ind. 1882.
12

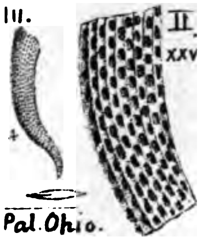
Ptilodictya falciformis. Nicholson. Collett's Indiana Report of 1882, page 265, plate 12, fig. 1, a frond of this bryozoon, *natural* size. *Hudson river formation* in Ohio and Indiana.—Pal. Ohio, Vol. 2, 1875, page 259, plate 25, fig. 7, a small example of *natural size;* 7*a*, *enlarged* cross section; 7*b*, *much magnified* portion of surface. Nicholson has seen wider fronds. Allied to Hall's *P.* (*Escharopora*) *recta*, on the one hand, and to Goldfuss' *P. lanceolata* Billings' *P. gladiola*, and *P. sulcata*, on the other. Not uncommon near Cincinnati, O.—*III b.*



Ptilodictya fenestelliformis, Nicholson, Pal. Ohio, Vol. 2, 1875, page 263, plate 25, fig. 8, *nat. size*, small fragment; 8*a*, *enlarged* cross section; *b*, magnified cell surface, with one of the spots without cells. Easily mistaken for a *Fenestella;* might be mistaken for a *Chætetes* (*Monticulipora*); but its internal structure shows it to be a genuine *Ptilodictya.* *Hudson river strata* at Cincinnati, O. *III b.*



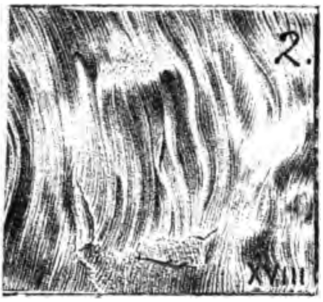
Ptilodictya flagellum, Nicholson. Ohio Pal. Vol. 2, 1875, page 262, plate 25, fig. 4, *nat. size*, frond broken above; *a*, cross section *enlarged*; *b*, magnified portion of frond. Smaller, narrower and more bent than *P. gladiola*, Billings. Lebanon, O. *Hudson river strata.* *III b.*



Ptilodictya gilberti. See **Stictopora gilberti.** *VIII a.*

Ptilodictya labyrinthica. See **Stictopora labyr.** *II c.*

Ptilodictya (Stictopora) lichenoides ? Meek. A name proposed for this polyzoon of the *Corniferous limestone*, in Ohio, provided it be not *P. gilberti*. Pal. Ohio, Vol. 1, 1873, page 195, plate 18, fig. 2, which shows only the wrinkled surface of a piece of the axis. *VIII a.*

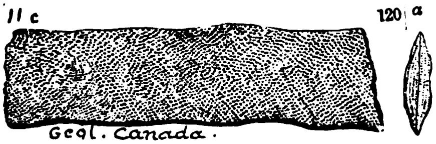


Ptilodictya ramosa. See **Stictopora ramosa.** *II b.*

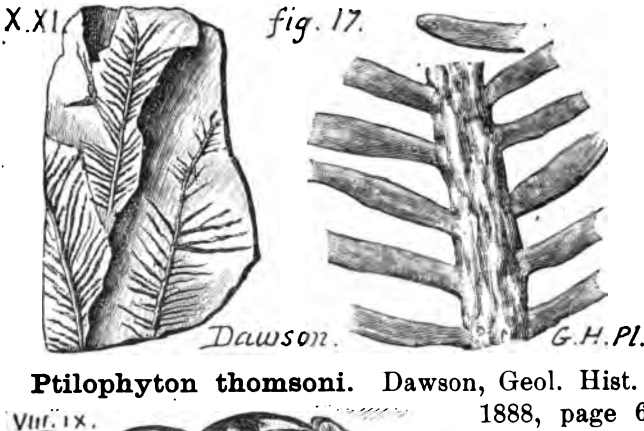
Ptilodictya serrata. See **Stictopora serrata.** *XIII.*

Ptilodictya shafferi. See **Stictopora shafferi.** *III b.*

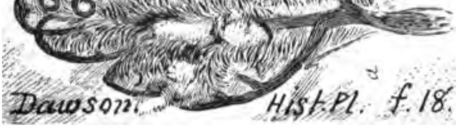
Ptilodictya recta, Geology of Canada, 1863, page 158, fig. 120, and 120 *a*, a cross section. *Trenton formation. II c.*



Ptilophyton plumosum. Dawson. Geol. Hist. Plants, 1888, page 62, fig. 17. *Lower carboniferous formation* of Nova Scotia. *X, XI.*



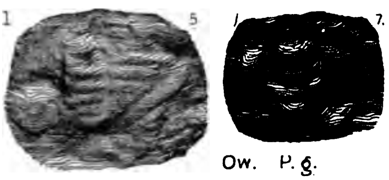
Ptilophyton thomsoni. Dawson, Geol. Hist. of plants, 1888, page 62, fig. 18. *Old Red* of Scotland. *Catskill, IX.*



Ptilophyton vanuxemi. Dawson. Quar. Jour. Geol. Soc. London, Vol. 18, p. 314, Vol. 17, fig. 57. Lesquereux makes the synonyms: *Filicites*, Hall. Geol. N. Y., 184, p. 275, fig. 125; Vanuxem, Geol. N. Y., 1843, p. 175, fig. 46; *Plumalina plumaria*, Hall. *Chemung.* Coal Flora, Vol. 3, 1884, p. 790. *See this Dictionary, page 246.*—Reported by I. C. White as found by him in Perry Co., Pa., Barnett's mills (specimen 5–9). *Hamilton upper slate. VIII c.* NOTE.—S. A. Miller, in his Appendix to Catalogue of American Pal. Foss. Cincinnati, 1877, 1883, says, "this name is proposed for *Lycopodites vanuxemi*, which is *Plumalina plumaria* and *Lycopodites plumula.* If the types are not *Graptolites* the genus may stand."

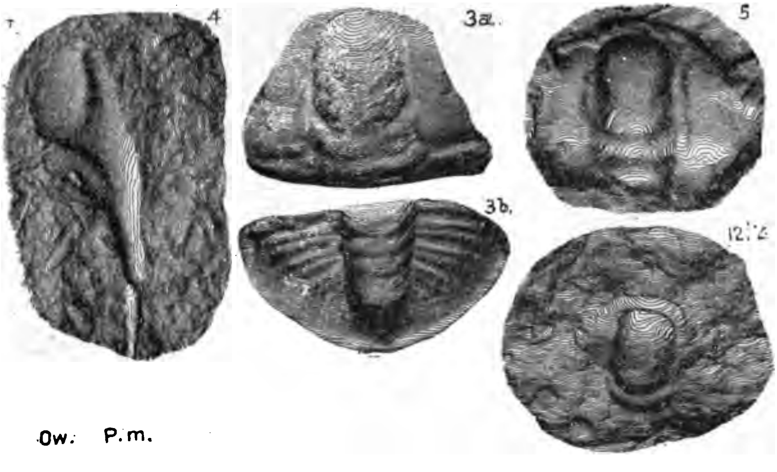
Ptilopora striata, Hall. Quoted by I. C. White, as name for his specimen 5–36 (OOO, 125, 11678), collected in Perry Co., Pa., at Barnett's mills, from *Hamilton upper shale. VIII c.*

Ptychaspis granulosa. (*Dicellocephalus granulosus*, Owen. Geol. Wis., etc., 1852, pl. 1, f. 5, tail piece, and f. 7, part of head and throat of a trilobite from the Third (Miniskah) Trilobite bed of the *St. Croix sandstone formation. Upper Cambrian. I.*



Ow. P. g.

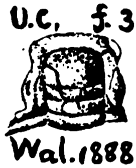
Ptychaspis miniscaensis. (*Dicellocephalus miniscaen-*



Ow. P. m.

sis). Owen Geol. Wisc., 1852, pl. 1, fig. 3, 12; pl. 1 A, fig. 4, 5; from Third Trilobite bed, near fork of Missiskah and Mississippi rivers. *Upper Cambrian ? I.*

Ptychaspis speciosus. Walcott. Potsdam Fauna, Saratoga Co., N. Y., 1888, fig. 3. See Bull. U. S. G. S. p. 62. Genus confined exclusively to *Upper Cambrian* (*Potsdam*) *formation.* To be looked for in Pennsylvania along the South Mountains and Chester North and South Hill ranges. *I.*



Ptychophyllum versiforme. See **P. knappi.** *VIII a.*

Ptycholepis marshii, Newberry. Monograph of Trias fishes and plants, in U. S. Geol. Survey, Vol. 14, 1888, page 66.

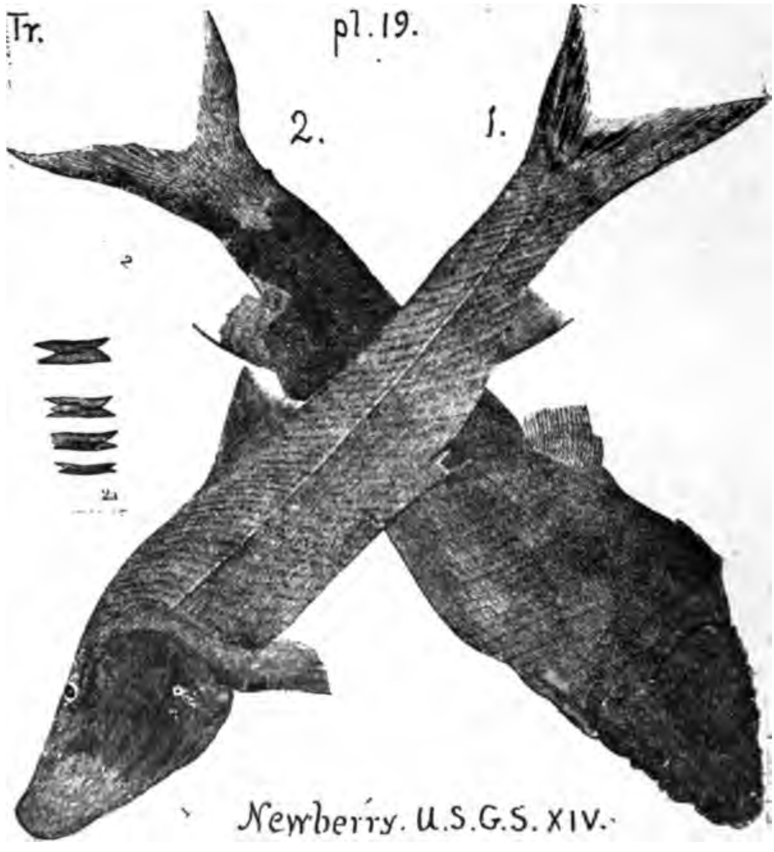
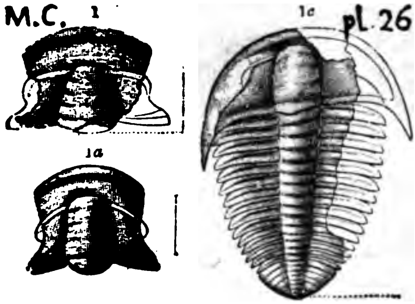
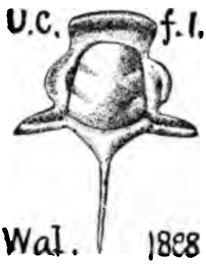


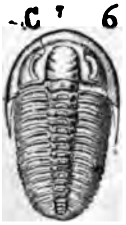
plate 16, figs. 1, 2, fish found in the brown sandstone quarries at Durham, Conn., fig. 2*a*, *enlarged* scales. *Trias.*



Ptychoparia adamsi. (*Conocephalites adamsi*, Billings, 1861, Geo. Vt., fig. 355; Pal. Foss. I. fig. 15. Geo. Can., 1863, fig. 294. *Conocephalites arenosus* Billings, Geo. Vt., fig. 358; Pal. Foss. fig. 18; Geol. Can., fig. 297). Walcott, Bulletin No. 30, U. S. G. S. page 195, plate 26, fig. 1, head from "Red Rock," east of Highgate springs, Vt., figs. 1*a*, 1*b*, narrow and broad forms of head from limestone formation, 2 m. E. of Swanton, Vt. Fig. 1 c, nearly entire specimen from Parker's quarry, Georgia, Vt. *Lower Cambrian* (*Georgian*) *formation. L. C.*

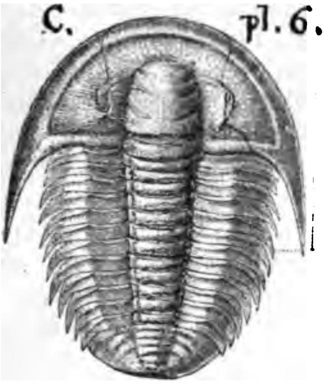


Ptychoparia calcifera. Walcott. Potsdam Fauna, Saratoga Co., N. Y., 1888, fig. 1. See Bull. 30, U. S. G. S. page 62. U. C. Upper Cambrian (Potsdam) formation. To be sought in Pennsylvania along the South Mtns, and Chester Valley. *Potsdam. I.*



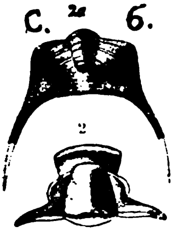
Ptychoparia emmrichi, Corda's second type of the genus in Europe; Walcott, Bulletin No. 10, U. S. G. S. pages 13, 14, 35, 37, plate 6, fig. 7, copied from Barrande, to discuss the genus *Ptychoparia.*

Ptychoparia cordillera, Rominger, Proc. Acad. N. S. Phila. Jan. 1887, p. 17, pl. 1, f. 7, has 19 segments in its thorax, like *Ptychoparia piochense* (Walcott), but a head more like *Ptichoparia kingi* (Meek). It was found among the Mt. Stevens' fossils in W. Canada, which Walcott (Amer. Jour. Sc. Sep., 1888) makes *Middle Cambrian*, *M. C.*



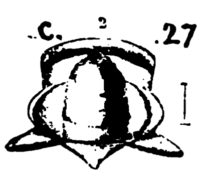
Ptchoparia (*Crephicephalus*) **haguei**, Walcott, Bulletin No. 10, U. S. G. S. pages 35, 36, plate 6. fig. 6, typical form of genus *Crephicephalus* of Hall and Whitfield. *Middle Cambrian*. *M. C.*

Ptychoparia housensis, Walcott. (Dec. 1888). *Lower Cambrian*, *L. C.*

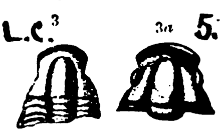


Ptychoparia (*Crephicephalus*) **iowensis**. Walcott, Bulletin No. 10, U. S. page 36, plate 6, fig. 2, head, without the loose cheeks; fig. 2 a, tail (pygidium). *Middle Cambrian*. *M. C.*

Ptychoparia kingi. (Meek, sp.) Walcott says (Dec. 1888) *Lower Cambrian*. *L. C.*



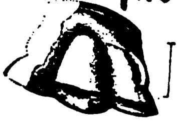
Ptychoparia miser. (*Conocephalites miser*, Billings, 1861, Geol. Vt. fig. 354; Geol. Can. 1863, fig. 293; Pal. Foss. I, plate 12, fig. 14.) Walcott, Bull. No. 30, U. S. G. S. page 199, plate 27, fig. 2, drawn from type specimen in collection of Geol. Sur. Canada. *Lower Cambrian* on the Straits of Belle Isle, similar to *Georgian rocks* of Vermont. *L. C.*



Ptychoparia orestes, Hartt. (*Conocephalites halli*, Hartt. Acad. Geol. Dawson, 3d ed. pp. 649, 654.) Walcott, Bulletin No. 10, U. S. G. S. page 39, plate 5, fig. 3, type specimen of *Conocephalites halli*; fig. 3*a*, type of *Conocephalites oretes*. *Lower Cambrian* (St. John) formation. *L. C.*

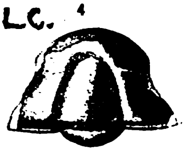
Ptychoparia orestes. var. thersites. (*Conocephalites thersites*, Hartt, Acad. Geol. p. 653.) Walcott, Bulletin No. 10, U. S. G. S. page 40, plate 45, fig. 2, type of *C. thersytes*, *enlarged twice*. *Lower Cambrian* (*St. John*) *formation*, New Brunswick. *L. C.*

L.C. 2 pl.5

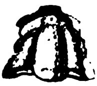


Ptychoparia ouangondiana and variety **aurora** (*Conocephalites ouangondiana*, Hartt, 1868, Acad. Geol. Dawson, 2d ed. p. 651, 654.) Walcott, Bulletin No. 10, U. S. G. S. page 37, 38, plate 5, fig. 4, × 3, frontal furrow nearly obsolete; 4*b*, distorted; 4*c*, × 3, young head in proper shape; 4*d*, 4*f*, 4*c*, × 2, type, distorted. Plate 5, fig. 5, × 2, type of Hartt's *aurora* *L. C.*

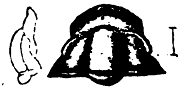
L.C. 4



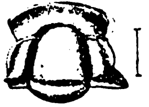
4b



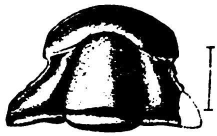
4c pl. 5



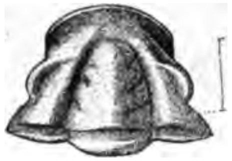
4d pl. 5.



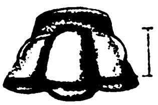
4f



4e



5



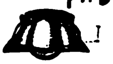
Ptychoparia piochensis, Walcott. *L. C.*

Ptychoparia ? prospectensis, Walcott. *L. C.*

tychoparia quadrans, Hall & Worthen. *L. C.*

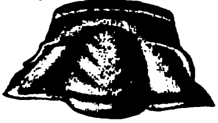
Ptychoparia quadrata. (*Conocephalites quadrata*, Hartt. Acad. Geol. Dawson 2d ed. p. 654.) Walcott, Bull. 10, U. S. G. S. page 39, plate 5, fig. 1, *enlarged twice*, type. *Lower Cambrian* (*Saint John*) *formation*, New Brunswick. *L. C.*

L.C. 1 pl.5

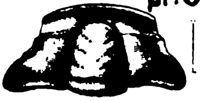


Ptychoparia robbi. Hartt. (*Conocephalites formosus* Hartt, 1868, Acad. Geol Dawson, 2d ed. pp. 648, 654.) Walcott Bull. 10, U. S. G. S. page 36, plate 6, fig. 5, *enlarged twice*,

L.C. 1

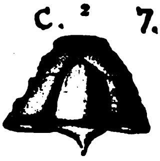


1a pl.6

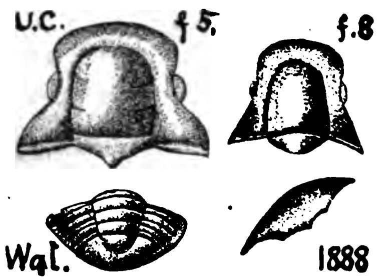


type; fig. 1*a*, *enlarged twice*, type of Hartt's *C. formosus. Lower Cambrian (Saint John) formation. L. C.*

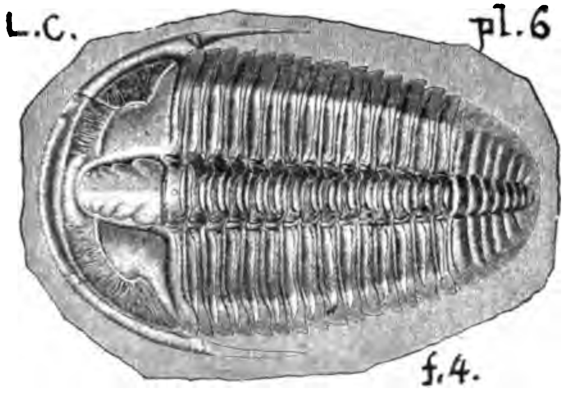
Ptychoparia rogersi. Walcott, Bulletin No. 10, U. S. G. S. page 47, plate 7, fig. 2. Natural size, type specimen. (Species only known by central plate of head, and in two specimens, portions of thorax. *Middle Cambrian (South Braintree) argillite,* Hayward's quarry, Mass. *M. C.*



Ptychoparia (A) saratogensis. Walcott, Potsdam Fauna, Saratoga county, N. Y., 1880, figs. 5 and 8. See Bull. 30, U. S. G. S. page 62. *Upper Cambrian (Potsdam) formation.* To be sought in Pennsylvania along the South Mountain, and the Chester Valley N. and S. Hill ranges. *I.*

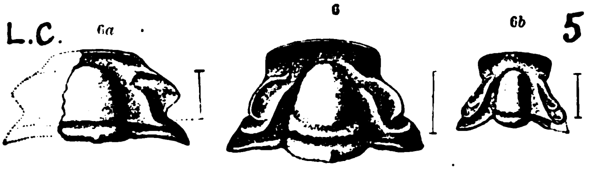


Ptychoparia striata. Barrande; used by Walcott, in Bulletin No. 10, U. S. G. S. page 35, 36, plate 6, fig. 4. taken from Barrande, to discuss the genus. *Lower Cambrian* of Bohemia. *L. C.*

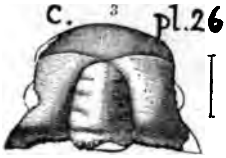


Ptychoparia subcoronata, Hall and Worthen. *L. C.*

Ptychoparia tener. (*Conocephalites tener* and *neglectus.* Hartt, 1868, Acad. Geol. Dawson, 2d ed. pp. 652, 654. (Walcott, Bulletin,

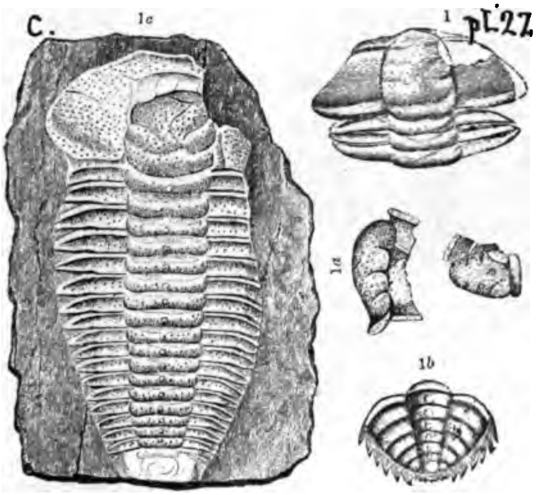


10, U. S. G. S. page 41, plate 5, fig. 6, 6*b*, *enlarged twice*, types; 6*a*, *enlarged twice*, type of Hart's *neglectus*. *Lower Cambrian* (*Saint John*) *formation*. N. Brunswick. *L. C.*



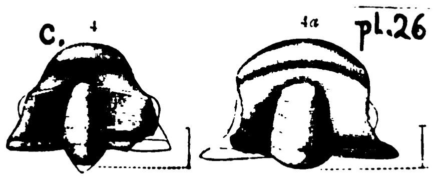
Ptychoparia teucer. (*Conocephlites teucer*, Billings, 1861, Geol. Vt. II, 951, fig. 356; Pal. Foss. I, p. 13, fig. 16; Geol. Can. 286, fig. 295.) Walcott, Bulletin No. 30, page 197, plate 26, fig. 3, from "Red sandrock" east of Highgate Springs, Vt. *Lower Cambrian* (*Georgian*) *formation;* Vt.; also below Quebec. *L. C.*

Ptychoparia trilineata. See **Conocoryphe trilineata,** Walcott. This is *not Triarthrus* or *Calymene beckii*, as asserted on page 108 of this Dictionary; for Walcott has a hundred specimens of it obtained by him on the typical field of Eastern New York; it is a *blind* triolobite, and belongs to the *Olenellus* (*Georgian*) *Lower Cambrian zone*, beneath the *Paradoxides* zone; whereas *Cal.* or *Triarthrus beckii* is a *Hudson River* trilobite. (MS. Letter and Paper before Bost. Nat. Hist. Soc. Dec. 21, 1888.)



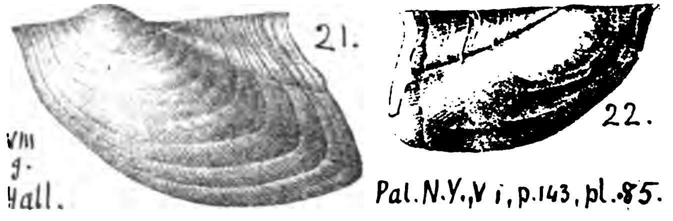
Ptycoparia trilineata. (*Atops trilineatus* Emmons, 1844, Tac. Syst. p. 20, fig. 1, plate 2, fig. 3; Agric. Rt. N. Y. I, p. 64, fig. 8, plate 14, fig. 3, 1849, Proc. AAAS. I, p. 16; 1855, Am. Geology, I, ii, 115, plate 1, fig. 16. See also Haldeman, 1848, Amer. J. S. [2] Vol. 5, p. 107; also Barrande, 1861, Bull. S. G. Paris [2] XVIII, 269, pl. 5, fig. 1. Trans. Albany Institute, Vol. X, page 23. *Atops punctatus*, Emmons' Man. Geol. 1859, p. 88, fig. 71. Barrande, 1861, Bull. S. G. France, Vol. 18, p. 271, plate 5, fig. 3. *Conecophalites trilineatus* Ford, 1871, 1873, 1875, Amer. Jour. Sci. Vol. 2, p. 33; Vol. 6, p. 135; Vol. 9, p. 205. *Conocoryphe*, Ford, 1880, Amer. Jour. Sci. Vol. 19, p. 152). Walcott, Bulletin 30, U. S. G. S. page 203, plate 27, fig. 1, one of Emmons' original specimens now in Am. Mus. Nat. Hist. N. Y. city; fig. 1*a*, 1*b*, *enlarged twice*, Ford's drawings of specimens found at Troy; 1*c*, copy of Emmons' original figure in Amer. Geol. plate 1. fig. 7. *Lower Cambrian* (*Georgian*) *Conglomerate limestone* beds near Troy; also below Quebec; also in Washington Co., N. Y. *L. C.*

Ptycoparia vulcanus. (*Conocephalites vulcanus*, Billings, 1861, Geol. Vt. II, 952, fig. 357; Pal. Foss. I, p. 14, fig. 17; Geol. Vt. 1863, 286, fig. 296.) Walcott, Bulletin No. 30, U. S. G. S. page 198, plate 26, fig. 4, compressed spec. from Parker's quarry; fig. 4*a*, more perfect one from "Red sandrock" east of Highgate Springs. *Lower Cambrian* (*Georgian*) *formation*, in Vermont. *L. C.*



Ptychophyllum knappi. *See page 837.*

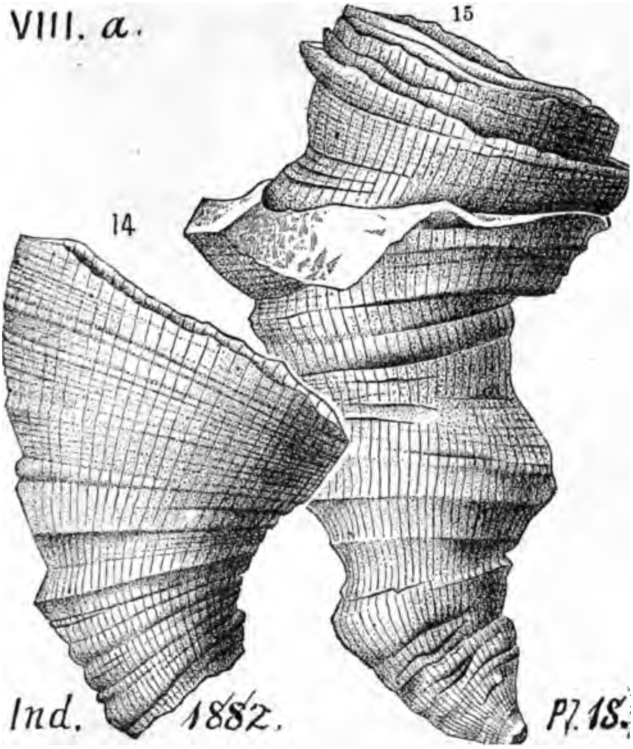
Ptychopteria beecheri, Hall, Pal. N. Y. Vol. V i. 1884, page 143, pl. 85, fig. 21, an entire eft valve; 22, right valve; somewhat resembles *P. trigonalis;* right valve like *P. alata*, but left valve very unlike it; distinguishing characters, its large rhomboidal form, extreme gibbosity and arcuation of left valve. From *Upper Chemung* at Warren, Pa. Randall's specimens 9613, 9616, 9617, 9618, 9620, 9621, wrongly labelled *Allorisma. VIII g.*

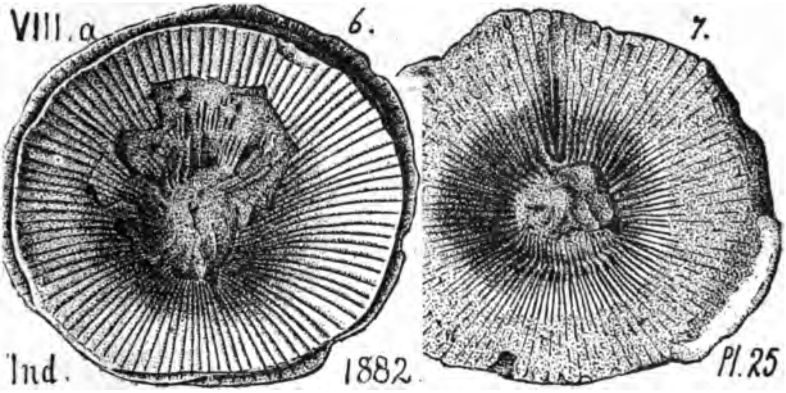


Ptychopteria elongata, Hall, Pal. N. Y. Vol. V i, 1884, page 141, pl. 85, fig. 10, hinge view; 11, ventral view; 12, large right valve; 13, left valve of 10; surface marked by fine radi-

(*Continued on page 838.*)

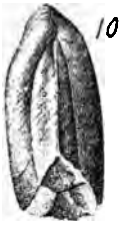
Ptychophyllum knappi. (*Ptychophyllum versiforme*, in part, Hall, 35th Rt. N. Y. State Mus. Nat. Hist. 1882.) Collett's Indianna Rt. 1882, page 278, plate 18, fig. 14, side of a short, and broad specimen; 15, longer, irregular one; plate 25, fig. 6, the cup of the coral showing its strong and coarse rays; 7, another cup with the rays partly obliterated by silicification. Coal Orchard, Ky. *Corniferous limestone. VIII a.*

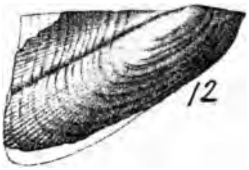

VIII. a.
14
15
Ind. 1882. Pl. 18.

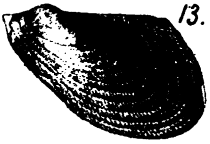


ating striæ crossed by distinct concentric striæ; resembles *P.*

VIII g: Pan. Con.



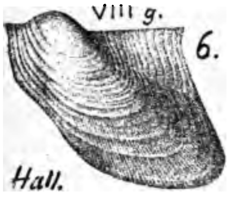




Hall, Pal.N.Y. Vol. V i, 1884, plate 85.

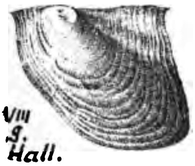
eucrate, but is less gibbous, longer, and without angularity along the body. *Chemung conglomerate* at Panama, N. Y. Also Randall's Warren specimen No. 9502. *VIII g.*

Ptychopteria falcata, Hall, Pal. N. Y. Vol. V i, 1884, page 136, pl. 85, fig. 6, entire left valve with surface markings; 7, smaller left valve; shell comparatively longer, body more oblique, and wing smaller than in *P. thetis*. In an *Upper Chemung* sandstone and conglomerate at Allegheny Springs, Warren Co., Pa. Specimens in Randall's collections at Warren, Pa., specimen 9612, wrongly labelled *Cypricardia;* also spec. 886–2. *VIII g.*



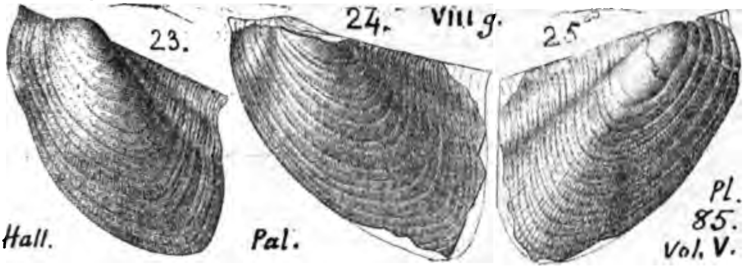
Pal.N.Y. 1884 Vol. V i, pl. 85

Ptychopteria galene, Hall, Pal. N. Y. Vol. V i, 1884, page 142, pl. 85, fig. 29, left valve pressed flat; 30, smaller ditto normal; (31, omitted); fine, regular, interrupted or undulating radii. and very fine concentric striæ, crowded into irregular bundles and lamellose on front part of shell; interior unknown. In lower beds of *Upper Chemung*, at Warren, Pa. Specimens in Randall's collections at Warren, Pa. Nos. 9499, 9450, 9501, 9502 A, 9623, 9624, 9625; wrongly labelled "*Yoldia?*" *VIII g.*

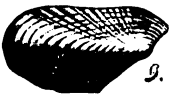


Pal.N.Y. V i, pl. 85

Ptychopteria lata, Hall, Pal. N. Y. Vol. V i, 1884, page 145, pl. 85, fig. 23, entire left valve; 24, larger ditto; 25, right valve showing its comparatively stronger wing-fold; concentric striæ crowded into bundles at unequal distances and wavy, turning abruptly outward just below the hinge, and becoming lamellose on front part of valve. Randall's collections at Warren, Pa. Specimens 9614, 9615, 9619; wrongly labelled *Allorisma*. *VIII g*.



Ptychopteria mesocostalis, H. S. Williams. U. S. Geological Survey, Bull. No. 41, 1887, pages 35, 36, plate 3, fig. 9, *enlarged twice*, doubtful genus, in *Portage shales* at Warsaw, N. Y.; fig. 12, *enlarged twice*, left valve, variety, from same at Attica, N. Y. *VIII f*.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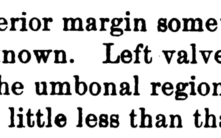
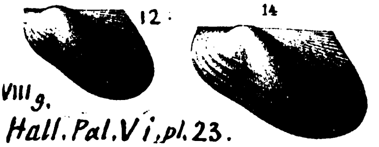
Ptychopteria obsoleta, *new species* Simpson. Trans. Amer. Phil. So. Philada, 1889, page 448, fig. 15. Species based on Randall's specimen 9622, wrongly labelled *Yoldia*. Shell of medium size, subrhomboidal in outline; body ovate oblique, at an angle of about forty degrees to the hinge line; height about three-fourths the length. Anterior margin abruptly rounded; basis margin curved outward at the extremities, concave at the middle; posterior margin somewhat abruptly recurved. Right valve unknown. Left valve moderately convex; greatest convexity at the umbonal regions. Hinge line essentially straight; length a little less than that of the body. Beak situated at about the anterior fourth of the shell, small, extending beyond the hinge line. A shallow broad sinus extends from the beak to the basal margin a little anterior to the middle. Anterior extremity acuminate, margin rounded. Wing triangular, joining the body at the posterior extremity; margin for a short distance straight, then abruptly curving forward, and just before reaching the cardinal line curving upward. Wing convex; flattened



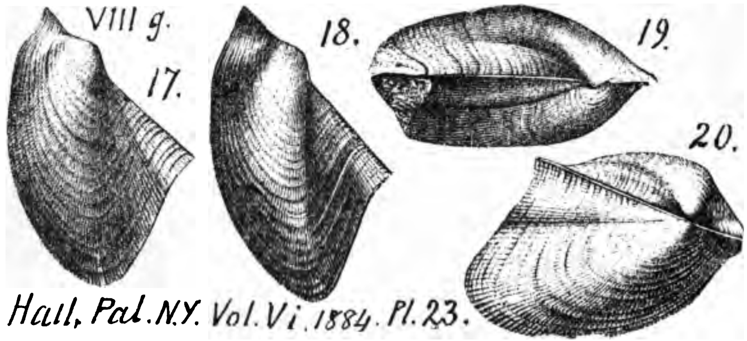
immediately below the cardinal line; separated from the body by a narrow but conspicuous depression. Surface ornamented by faint radiating striæ which are obsolete except on perfectly preserved specimens, and also by fine concentric striæ, which frequently become fasciculate on the anterior portion of the shell. This species may be distinguished from any other at present known by the slight obliqueness of the body of the shell, the basal margin being nearly parallel with the hinge line; the margin is decidedly convex; in nearly all other species it is straight or concave; the wing extends beyond the body of the shell. The outline is very similar to that of some forms of the genus Cypricardinia. Hill north of Warren, Warren county, Pa. *Chemung, VIII g.*

Ptychopteria proto, Hall, Pal. N. Y., Vol. V i, plate 23, figs. 12, 14, two left valves; found in the *Upper Chemung*, near Smethport, McKean Co., Pa. Also Randall's Warren specimen No. 9590. *VIII g.*



VIII g.
Hall, Pal. V i, pl. 23.

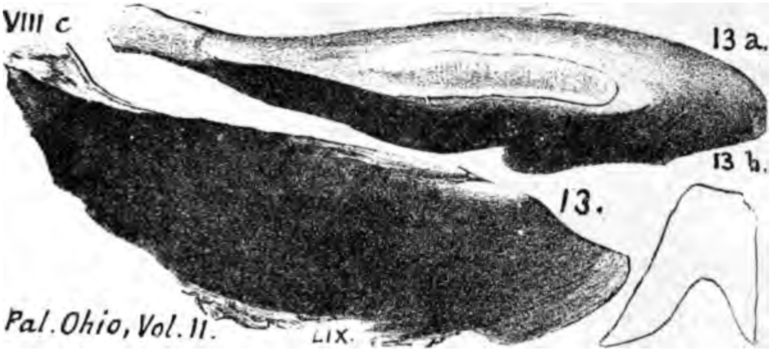
Ptychopteria salamanca, Hall, Pal. N. Y. Vol. V i, 1884, page 131, pl. 23, fig. 17, 18, two left valves; 19 hinge view of 18, showing the relative convexity of the valves and comparative elevation of the beaks; 20, right side of specimen with both valves partly opened. Specimens various on account of degrees of preservation; often pressed out of shape; weathered ones often without striæ, and concentric lamelle more prominent. In a *Chemung sandstone* above the *Salamanca conglomerate*, Salamanca, N. Y. In Penna. collections, specimen 882–1. *VIII g.*



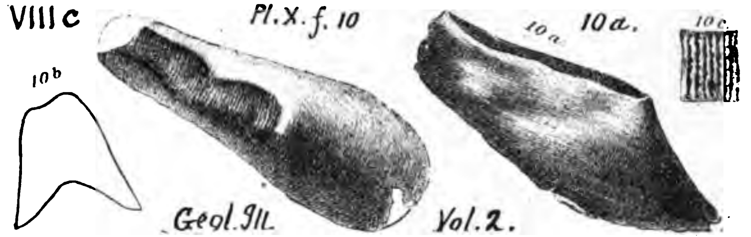
Hall, Pal. N.Y. Vol. V i. 1884. Pl. 23.

Ptycopteria —— ? Wrongly named *Avicula* —— ? on page 71 above. (R. P. Whitfield's corrections, Jan., 1889.)

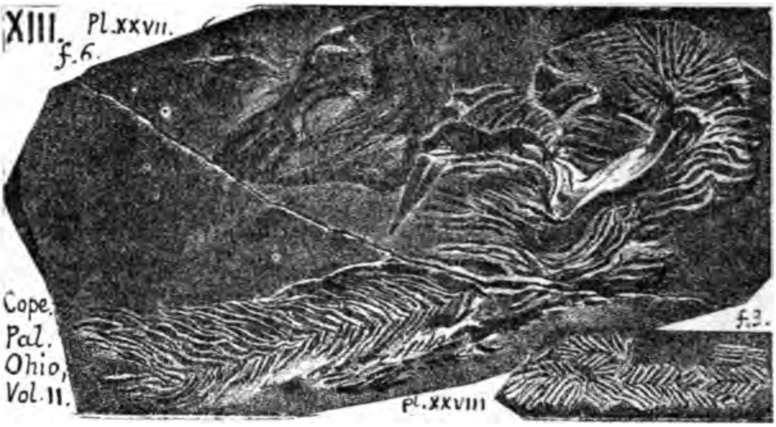
Ptychodus calceolus, (*Rinodus calceolus,* Newb. & Worthen, Pal. Illinois, Vol. 2, 1866, *Hamilton.*) Pal. Ohio, Vol. 2, 1875, page 59, plate 59, fig. 13, *a*, *b*, *natural size*, side view, upper surface, and cross section of a *Chimæra*-like fish-tooth, from *Hamilton strata* at Davenport, Iowa; probably *Rinodus calceolus* of Geol. Illinois, Vol. 2, plate 10, fig. 10, changed to *P. calceolus*, Geol. Ill., Vol. 374; but longer and narrower, and crown surface raised instead of depressed; but may be the difference between the upper and lower teeth fitting into each other. *VIII c.*



Ptyctodus (*Rinodus*) **calceolus,** Newberry and Worthen, Geol. Ill., Vol. 2, 1866, page 106, plate 10, figs. 10, 10 *a*, *b*, crown side and profile of the tooth; *c*, *magnified* portion of the triturating surface. *Hamilton group. VIII c.*

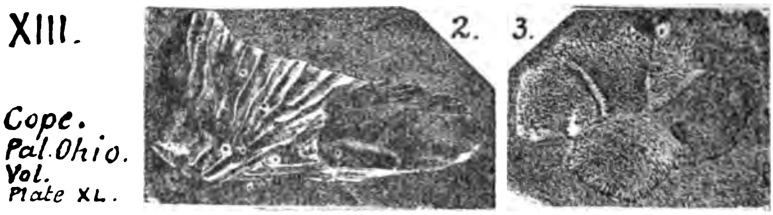


Ptyonius marshii, Cope. (*Colosteus marshii.*) Pal. Ohio, Vol. 2, 1875, page 375, plate 27, fig. 6, *twice natural* size; plate 28, fig. 3, *natural size.* Some of the Coal measure reptiles called by Cope *Sauropleura* (Proc. Acad. Nat. Soc. Phila.,



1863, 217) and *Oestocephalus* (Trans. Am. Philos. Soc. Phila. XIV, p. 20) were re-named *Ptyonius* (Trans. A. P. S. April, 1874); are the most fish-like of the ancient frogs; with numerous small, both simple and grooved teeth, extending in one species at least to the tips of the slender jaws; and with a head which is a curious miniature of the later *Ichthyosaurus*. Compare the Irish genus *Lepterpeton*, Huxley; and *Urocordalys*, Huxley. In the figure the three thoracic shields have been displaced; no teeth preserved; nothing like limbs shown; back armour consists of long, narrow sub-cylindrical scales, diverging from the middle line (as in the long rod-like pieces or *Oestocephalus.*) *XIII.*

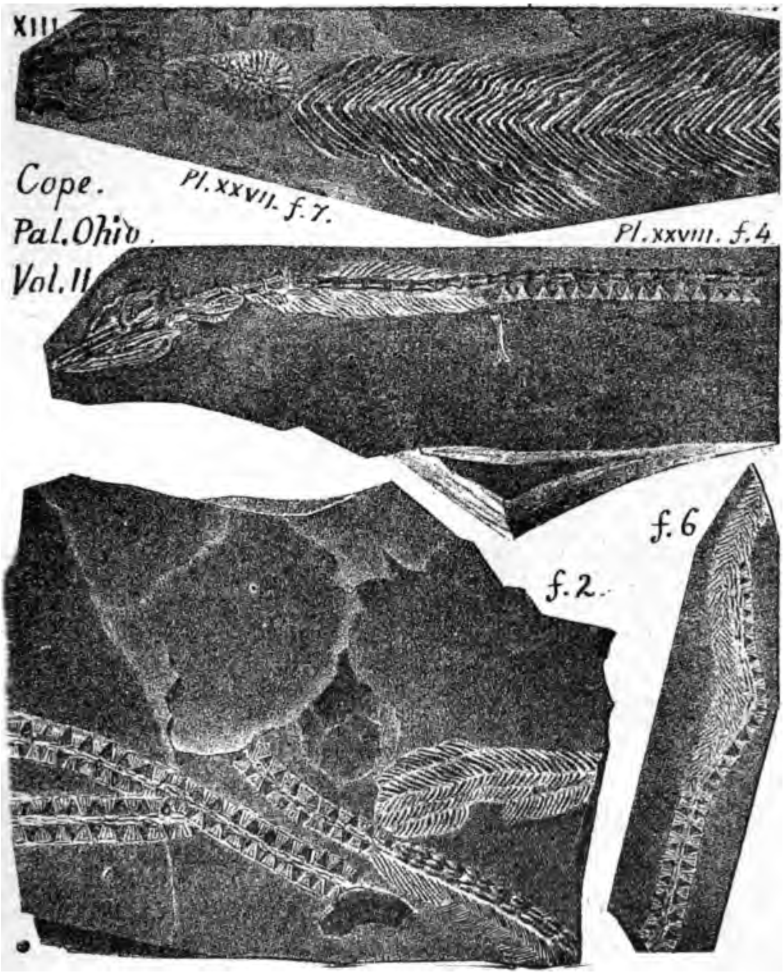
Ptyonius nummifer, Cope, Pal. Ohio, Vol. 2, 1875, page



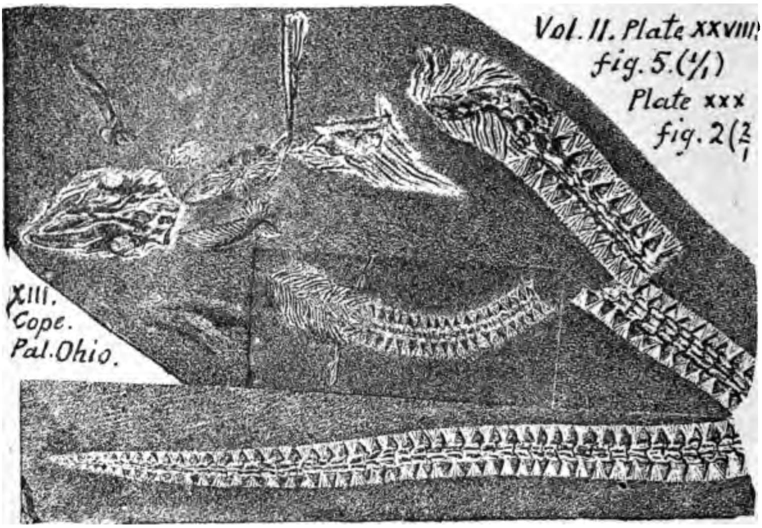
374, plate 40, fig. 2, 3, both *natural size*. Two specimens of this reptile are described by Cope (p. 374, 375.) One shows well developed tail fans; breast shields of a peculiar form (no side shields visible) sculptured in strong ridges; a head different from and wider than that of the other four known species;

eyes set apart a distance ⅔ their length; very thin head bones. The other shows two slender rather long hind legs; animal probably had no fore-limbs. *Coal measures. XIII.*

Ptyonius pectinatus, (*Sauropleura pectinata*, Proc. Acad.



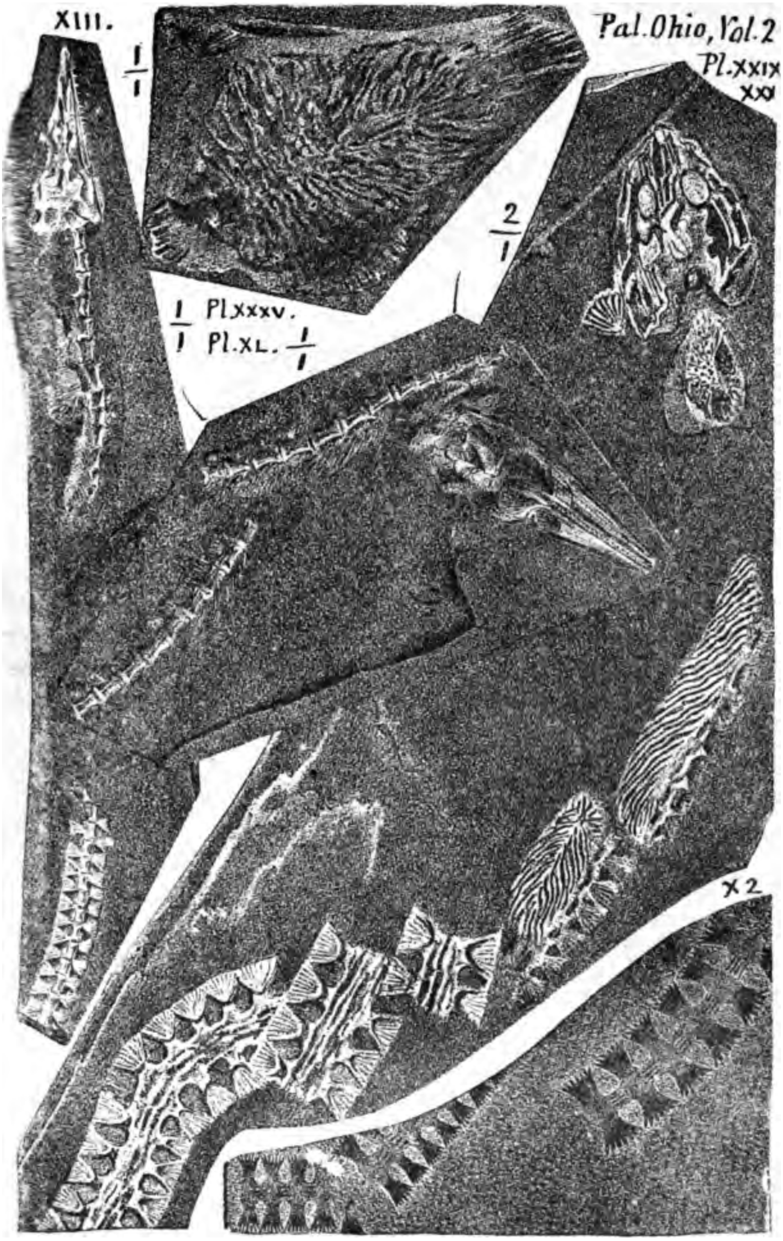
Nat. Sc. Philada., 1868.) Pal. Ohio, Vol. 2, 1875, page 377, plate 27, fig. 7, *twice natural size;* plate 28, figs. 2, 4, 6, *natural size;* plate 29, fig. 2, and plate 30, fig. 2, *twice natural size;* plate 35, figs. 1, 2, 3, and plate 40, fig. 1, *natural size.* At least eight well defined specimens were collected at first, and subsequently others, from the famous Coal measure batrachian locality at Linton, Ohio, on none of which any trace of fore limbs could be detected; although on two of them hind leg bones appear. The lance-shaped head, with its long slender pointed muzzle, and large eye holes, is well shown; teeth conical, sharp, the larger ones striated lengthwise; also a series of minute conical teeth at the palate; throat shield well marked; rod-scales cover the belly like bristles; vertebræ short, with spiny fans on each side. *XIII.*



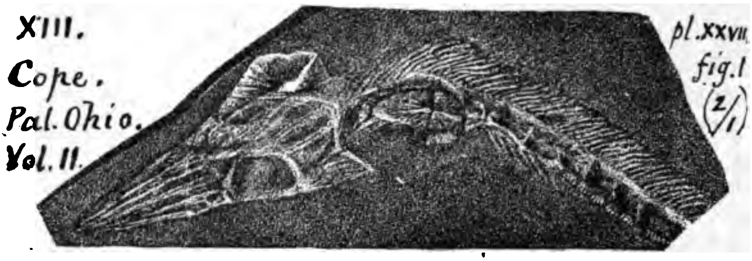
Ptyonius ? serrula. Cope (*Oestocephalus*, Proc. A. P. S. 1871, p. 177. Trans. Amer. Philos. Soc. Philada., 1874.) Pal. Ohio, Vol. 2, 1875, page 379, plate 28, fig. 5, *natural size;* plate 30, fig. 1, *enlarged twice.* Single almost complete specimen. One-half as large a reptile as *P. pectinatus;* but is not its young, for its breast-shield has a more complex (mature) sculpture, and the tail is relatively longer. In a second specimen weak hind legs appear. Linton, O., *Coal measures. XIII.*

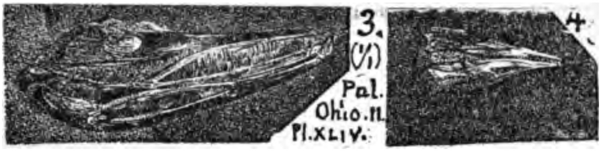
Ptyonius uinchellanus. Cope (*Oestocephalus uinchellanus*, Proc. Amer. Philos. Soc. 1871, p. 177, *Coal measures.*) Pal. Ohio, Vol. 2, 1875, page 376, plate 28, fig. 1. *twice life size;* unique specimen of the head and fore part of the body

Ptyonius pectinatus. *See page 844.*

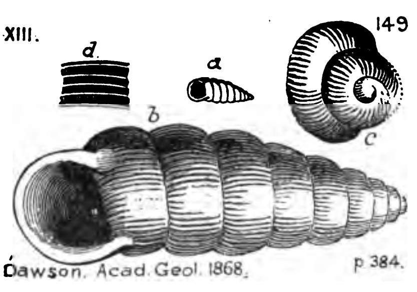


of the reptile, showing the breast shield, delicate hair-like abdominal rods, and some of the fan-like neural spines of the backbone. It is of the size of *P. pectinatus*, and perhaps belongs to that species. *Coal measures. XIII.*





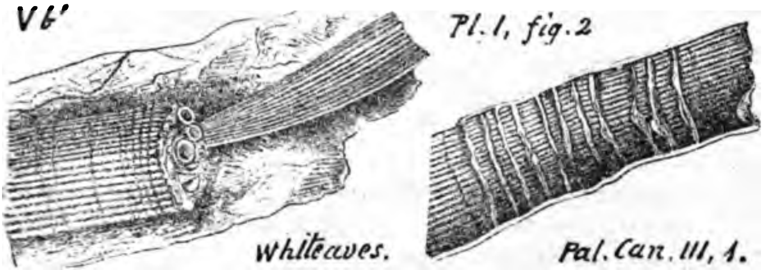
Ptyonius ? Side view of the head of one of these *coal measure* reptiles found at Linton, O. Pal. Ohio, Vol. 2, plate 44, fig. 3, *natural size.* Another cranium is shown on plate 35, fig. 4, also natural size. None of these reptiles have been recognized as yet in Pennsylvania, but there is every reason for expecting their discovery in the roof shales of one or other of our bituminous coal beds. *XIII.*



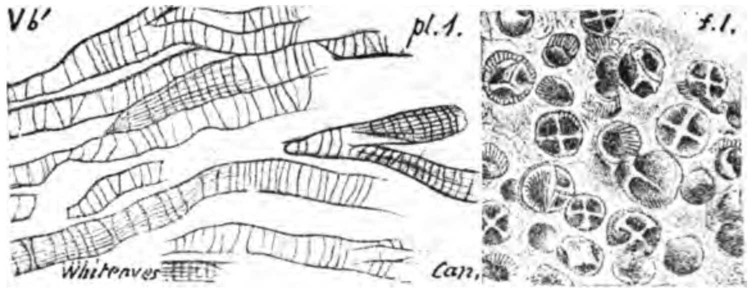
Pupa vetusta, Dawson. Acadian Geol. 1868, p. 384, f. 149, a minute *land shell* of the Coal age (the first ever found in Palæozoic formations), got from the inside of a rotten tree (*calamite*) standing erect in the Joggins Cliff of the Bay of Fundy. 149 *a*, *natural size ; b*, *enlarged 6 times ; c*, apex *enlarged ; d*, surface marking *magnified ;* quite like the *Pupas* now living; all the more remarkable because no other fossil true land shell is known up to the Tertiary strata (1863, Dawson). Found with reptiles; and also in another bed, 1217 feet lower (Group VIII, between coals 37 and 38 of

Logan's section of the S. Joggins), a bed of fine mud rock (2 inches thick); the shells abundant and perfect, except being flattened by the subsequent pressure of Coal measure sediments, and in all stages of growth, the young having a very different shape from the old. There is every reason to expect to find such land shells in the Pennsylvania coal measure mud layers. *XIII.*

Pycnostylus elegans, Whiteaves. G. S. Can. Pal. Foss III, part 1, 1884, page 4, plate 1, fig. 2, showing the mode of budding (one bud being 1¼ in. long) from others broken off at the base; entire circle probably seven or eight buds; possibly *P. guelphensis* denuded of epitheca; *2a*, natural section of a part of the corallite, exhibiting its complete tabulæ, and marginal septa. Found at Hespeler, and at Durham, Canada West. *Guelph formation. V b'.*



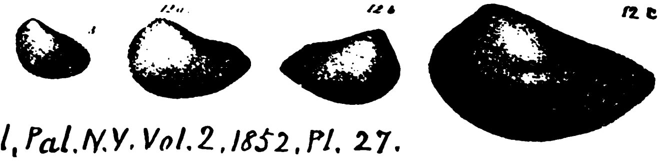
Pycnostylus guelphensis, Whiteaves (*? Amplexus bullatus* Bill. 1863. *Amplexus (?)* sp. Nicholson, 1875.) Geo. Sur. Canada, Palæozoic Fossils, Vol. III, part 1, 1884, page 3, plate 1, fig. 1, *natural size*, natural section of some of the corallites; 1*b*, natural cross section showing their partitions after budding; found at various places; a characteristic and common fossil of the *Guelph* (uppermost *Niagara*) in W. Canada. *V, b'.*



Pygopterus scutellatus, Newberry. Proc. Ac. Nat. Sci. Phila., 1856, page 98. *Colosteus crassiscutatus*, Cope, Trans. Amer. Phil. Soc. Phila. Vol.. XIV, p. 23. **Colosteus scutellatus,** Cope, Proc. Amer. Phil. Soc. Phila., 1871, p. 41. Pal. Ohio, Vol. 2, 1875, plate 99, figs. 1, 2, 3, one of the Ohio *coal measure* batrachian reptiles, with strongly sculptured breast shield, side plates, and belly covered with oblique scales. *XIII.*

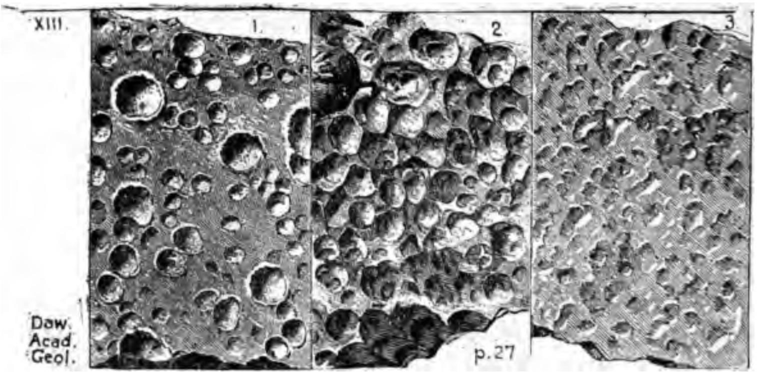
Pyrenomoeus cuneatus, Hall. Pal. N. Y. V.ol. 2, 1852, page 87, plate 27, fig. 3. retaining the shell faintly striated, beak remarkably elevated, and front end abruptly rounded; 13 *a*, *b*, casts of opposite valves; *c*, cast of a large individual, showing several prominent folds parallel to the lines of growth. Fig. 3, was found below the *Clinton fossil ore bed* in Walcott, N. Y. Fig. 12*a*, *b*, *c*, in a shaly sandstone near the base of the *Clinton*, together with (*Agnostis*) *Beyrichia*, in New Hartford, Oneida Co., N. Y. In Perry Co., Pa., collected by Claypole (Spec. 60–5, two), in Center township, at Waggoner's mill. *Clinton*, *Va*. NOTE.—Hall established the genus for shells like Nucula, and so named it.

Va.

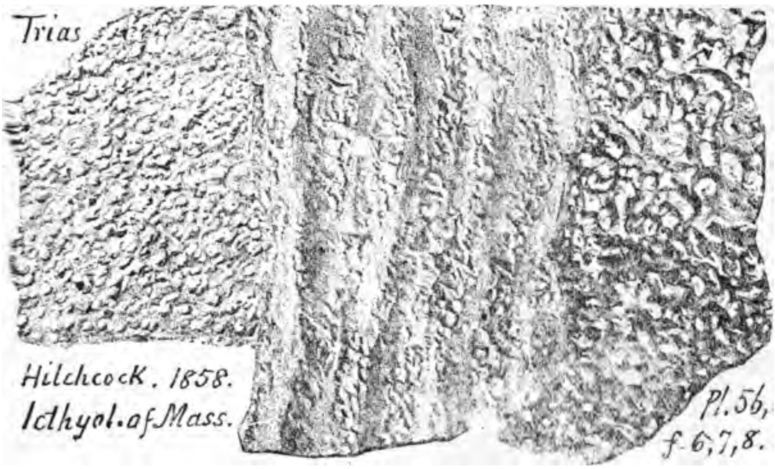


Hall, Pal. N.Y. Vol. 2, 1852, Pl. 27.

Rain drops, with *Ripple marks*, and *Mud cracks*, have been noticed on the surfaces of rock strata of many ages. Among the earliest instances are the characteristic forms given by N. W. Perry in the American Naturalist of December, 1889, from photographs of the surfaces of slabs of *Hudson River* (*Cincinnati*) *slate. III c.*—On Carboniferous mud shale (figs. 1, 2), compared with rain pits now made on the muddy shores of the Bay of Fundy. (Fig. 3), Dawson, Acadian Geol. 1868, p. 27. —In Hitchcock's Ichthyology of Mass. 1858, plate 32, fig. 1, may be found an instructive exhibition of the print of a boy's naked foot, a bird's foot, and many rain drop pits around and upon them. In his Final Report of the Geol. Mass. he gives a sketch of a good specimen of rain drops *natural size*. I take from his Ichthyol. Mass. plate 56, figs. 6, 7, 8, of ripple marks and rain drops, *much reduced*, fig. 7, being an unusual instance of rain drops confined to the furrows of the rippling slabs of red sandstone in the Amherst Museum, 4," 9," and 7" long. *Trias.*



Dow. Acad. Geol.

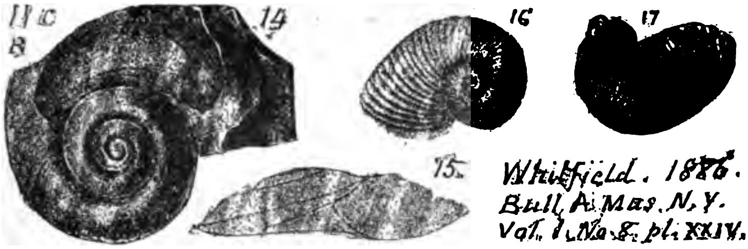


Hitchcock. 1858. Icthyol. of Mass. Pl. 56, f. 6,7,8.

Raniceps lyelli. See **Pelion lyelli.** *XIII.*

Rangifer caribou. See **Reindeer.**

Raphistoma compressum, Whitfield, Bull. Amer. Mus.

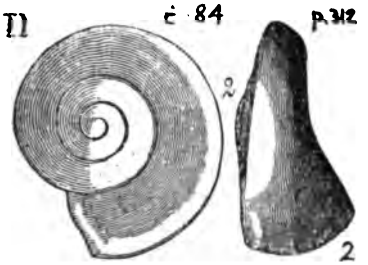


Whitfield. 1886. Bull. A. Mus. N. Y. Vol. 1, No. 8, pl. XXIV.

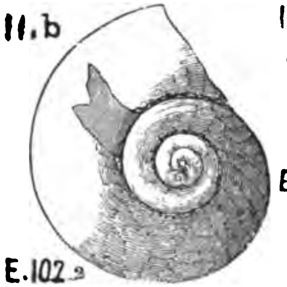
Nat. Hist. N. Y. Vol. 1, No. 8, 1886, page 309, plate 24, figs. 14, vertical view, and 15, outline profile of the type. (*To these are added figs. 16, 17, of Cliospira lirata, Whitfield, from the same plate.*) Of the type of *R. lenticularis*, Sow.; generally like *Pleurotomaria canadensis*, Billings, Pal. Foss, I, f. 328, but more compressed, and with fewer whorls; probably most like *P. harpya*, Bill. Fort Cassin, Vt. *Bird's eye limestone. IIc.*

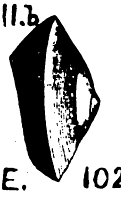
NOTE.—Whitfield's figs. 16, 17, above, are of a *single specimen* of a curious sinistral, trochiform gasteropod shell, found with the *Raphistomas*, etc., which he places in Billings' genus *Cliospira* of the *Quebec group* near St. Antoine (*C. curiosa*, Bill.) and names it *C. lirata*, because its surface is marked by strong, oblique, lamellose ridges, parallel to the margin of the aperture, or crossing the whorls obliquely backwards, and separated by grooves, like no other species of this genus. Compare also Whitfield's Wisconsin species *C. occidentalis* (Geol. Wis. IV, 1876) which he finds identical (?) with Lindstrom's Swedish *Onychocheilus reticulatum.* (Kong. Sv. V. A. H., XIX, No. 6, p. 196.)

Raphistoma labiatum. (*Maclurea labiata.*) Emmons, Geology of the Second District of New York, 1842, page 312. fig. 84, 2. From *Calciferous* and *Chazy formations. II a. b.*



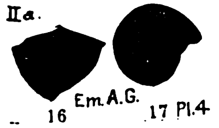
Raphistoma lenticulare. (*Pleurotomaria lenticularis.*) Emmons Geol. of N. Y., 1842, pages 392, 393, fig. 101, 2, 3. *Trenton* and *Hudson river formations.* In Pennsylvania, Centre Co., recognized by Ewing in *Trenton limestone.* (T4, 424.) In Mifflin Co. at Reedville, collected by C. E. Hall. Spec. 205–2



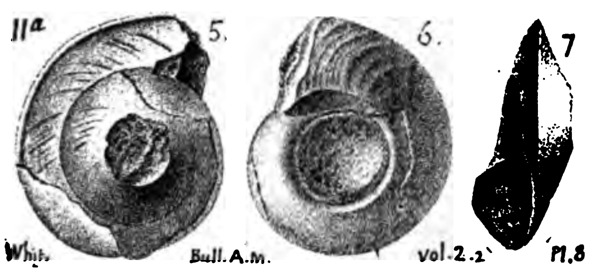


(only partially exposed) from very low *Trenton*, perhaps *Chazy* beds. In Blair Co., Martinsburg, Spec. 207–,1–2, from *Chazy limestone.* *II b*, *II c*, *III b*.

Raphistoma planistria. (Hall. Pal. N. Y. Vol. 1, 1848, *Chazy.*) *Scalites planistria*, Emmons, Amer. Geol. I, ii, 159, plate 4, figs. 16, 17; surface marked lengthwise with distinct, flat striæ, and arched in the middle of the whorls; mouth narrow and triangular. *Calc. sand.* Emmons, *II a;* *II b.* Hall has a variety *R. parvum*, also in *II b.*

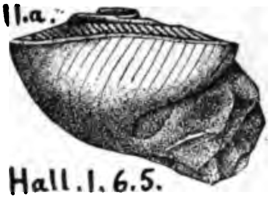


Raphistoma præviun, Whitfield. Bull. Amer. Nat. Hist. N. Y. Vol. 2, No. 2, page 52, plate 8, figs. 5, 6, 7, upper under and profile views of a large specimen, showing the *specific* peculiarity, a very broad umbilicus. Very numerous in *Calciferous sandstone*, at Beekmantown, N. Y. *II a.*



Raphistoma stamineum. H. D. Rogers' Geology of Pennsylvania, 1858, page 817, fig. 594. (See Hall's Pal. N. Y. Vol. 1, 1847, plate 6, fig. 5.) *Chazy formation.* *II b.*

R.594.

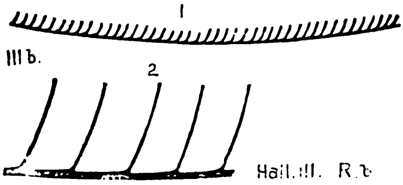


Hall.1.6.5.

Raphistoma striatum. (*Maclurea striata.*) Emmons, Geology of the Second District of New York, 1842, page 312. fig. 84, 3. *Chazy formation.* *II b.*

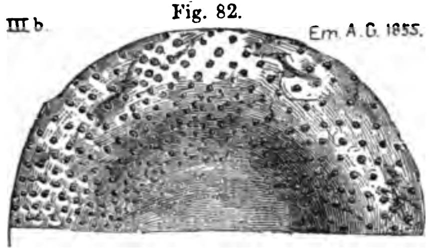
Raphistoma —— ? from the *Hudson river* formation, Hill, Perry Co., Pa., among Claypole's collections, six specimens, marked S. 226.—*III b.*

Rastrites barrandi. A graptolite of the Hudson river shale formation, which may be a form of *gracilis.* Hall, Pal. N. Y., Vol. 3, 1859, page 522, figs. 1, 2. *III b.*

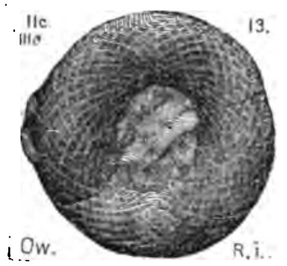


Reccptaculites circularis. Emmons, Amer. Geol. I, ii, 1855, page 230 woodcut 82; a coral like a thick flattened ring, studded with circular cells, arranged in lines across it obliquely. *Hudson river formation. III b.*

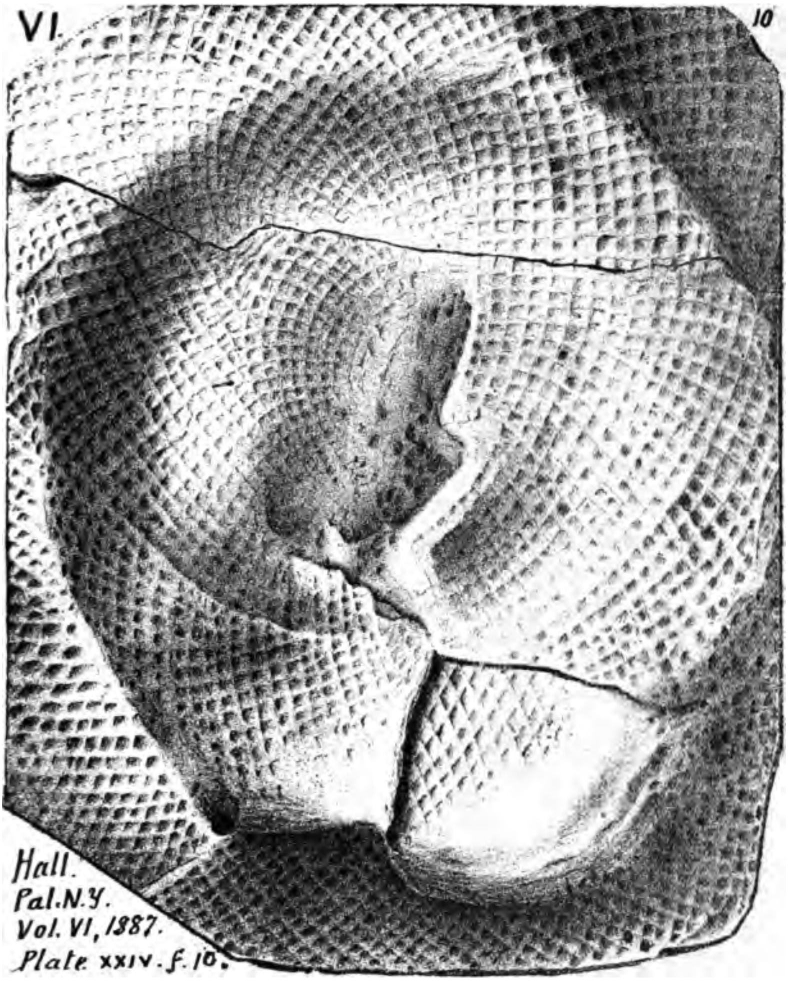
Fig. 82.



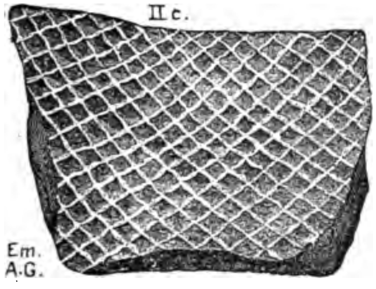
Receptaculites iowensis. (*Selenoides iowensis*), Owen, Geology of Wisconsin, Iowa and Minnesota, 1852, plate 2 B, fig. 13 (associated with plate 2, figs. 8, 9) from Turkey river, Iowa. *II c, III a.*

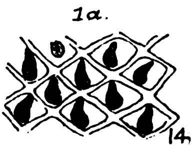


Receptaculites infundibuliformis, Hall. Pal. N. Y. Vol. 6, 1887, page 289, plate 24, fig. 10 (selected from figs 3 to 10), a large specimen of this sponge, which has been macerated, compressed, and a large part of the substance removed. (On the same plate are figures of the somewhat similar sponges *Ischadites squamifer*, and *bursiformis.*) They ought all to be found in the Pennsylvania outcrops, as they are found at Clarksville, N. Y. in *Lower Helderberg limestone, VI.*



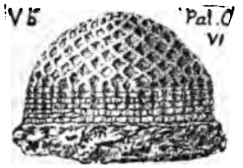
Receptaculites neptuni. (DeFrance, Diction. des Sci-Nat. Vol. 45, 1827.) Emmons, Amer. Geol. I,ii, 1855, p. 230, plate 14, fig. 1; described by Hall as somewhat globe like, hemispherical,



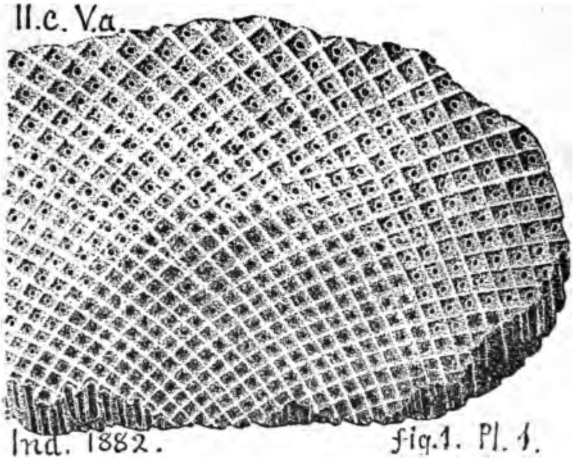


depressed in the center; a series of square cells, the mouth of a tube in each. *Trenton formation. II c.*

Receptaculites ohioensis, Hall and Whitfield, Pal. Ohio, Vol. 2, 1875, page 123, plate 6, fig. 1, a hemispherical specimen, showing the large rhomboidal cells over the dome and the narrower crowded cells on the larger vertical portion, the latter being probably a deception produced by the greater obliquity of the ranges, the peculiar apertures, and the presence of crystalline matter adhering to most of the specimens. Species easily distinguished by its small size and dome form, except from *R. hemisphericus*, Hall, of Wisconsin, which however has much larger cells and grows much larger; no *R. ohiensis* having been found more than 1¼" diameter. The little round (young?) ones resembles *R. globularis*, Hall, of the *Galena limestone*, which has cells twice as large. Yellow Springs, C. *Niagara limestone. V b.*

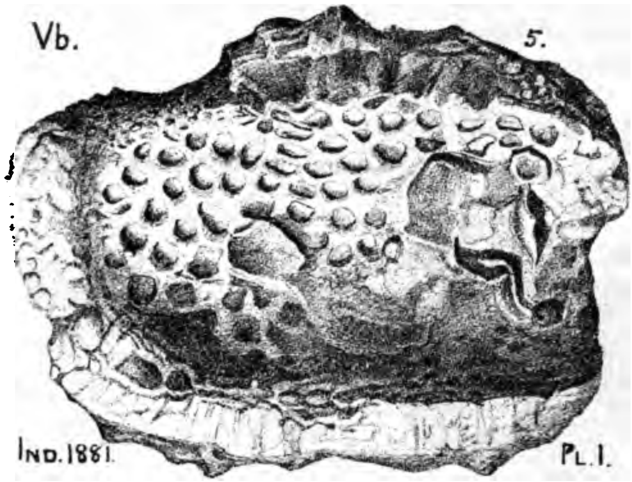


Receptaculites oweni. Hall (1861, Geol. Wisconsin, Galena limestone.) Collett's Indiana Report of 1882, page 243, plate 1, fig. 1, upper side of this Rhizopod. (It is the *Coscinopora sulcata* of Goldfuss. Owen's Rpt. on Mineral Reg. N. West, 1844, p. 40; also VanCleve.) *Trenton* (Galena lead-bearing limestone) formation in the West. Also, *Niagara* formation in Indiana (see Billings, Canad. Naturalist, June, 1865, with figures of structure.) *II c;—V a.*

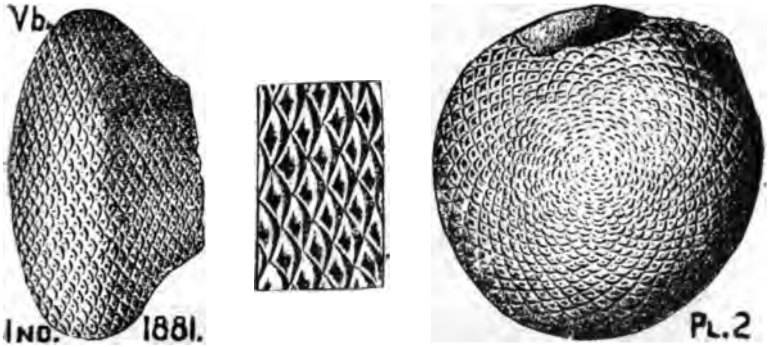

II.c. Va.
Ind. 1882.
fig.1. Pl. 1.

Receptaculites reticulatus. (*Orbituloides reticulata,*) Owen. Minn. Lands. 1844. *Niagara. V b.* (S. A. M.)

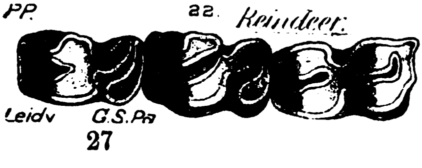
Receptaculites sacculus, Hall, in Collett's Indiana Report of 1881, page 222, plate 1, fig. 5, fragment of a specimen broken in two through the middle, and covered with *bryozoa* which obscure some of the characteristic features; but it is easily recognized by its sac-like form, differing from all other *Niagara* species. *V b.*



Receptaculites subturbinatus, Hall. Trans. Alb. Inst. Vol. 4, p. 224; 28th Rt. N. Y. State Mus. plate 3, 1879; Collett's Indiana, 1881, page 221, plate 2, figs. 1 to 3, cell margins very prominent, a very small species, approaching *R. hemisphericus* of the Wisconsin *Niagara formation. V b.*



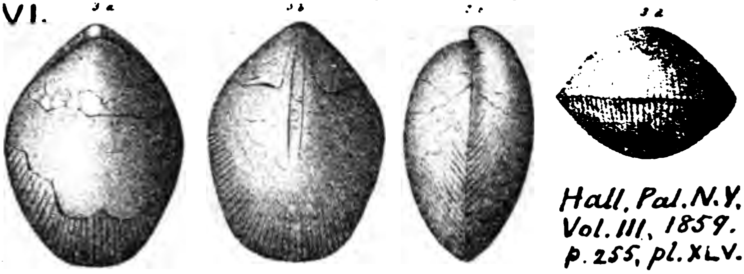
Reindeer teeth, found in Hartman's cave in Lehigh county, Pa. Geological Survey, Annual Report for 1887, page 5 and 20, plate 2, fig. 22, the triturating surface



of the last two lower premolar and first molar teeth of the left jaw of a *Rangifer caribon*, "barren ground reindeer" of the Canadian provinces, proving the coldness of climate which pervaded Pennsylvania when the Greenland glaciers covered the present sites of New York city and Cincinnati, and the walrus lived as far south as the Carolinas. *Recent*.

Rensselæria æquiradiata [(*Atrypa æquiradiata*, Conrad, Jour. Acad. N. Sc. Phila. Vol. 8. 1842, *Lowcr Helderberg.*) Hall, Pal. N. Y. Vol. 3, 1857, page 255, plate 45, selected figs. 3 *a*, *b*, *c*, *d*, dorsal, ventral, profile and front views; a large specimen which is proportionally longer than usual. Surface marked with simple regular radiating striæ, much stronger toward the edge. Like but much larger than *R. mutabilis*. In N. Y. along the Mohawk valley outcrop of the *Upper Pentamerus* (*Low. Held.*) *limestone*. *VI.*

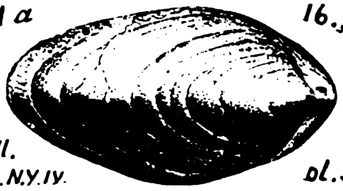
VI.

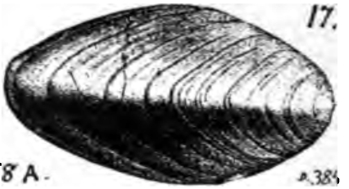


Hall. Pal. N.Y.
Vol. III, 1859.
p. 255, pl. XLV.

Rensselæria ? johanni, Hall. Palæontology of the State of New York, Vol. 4, 1867, page 385, plate 58 A, se-

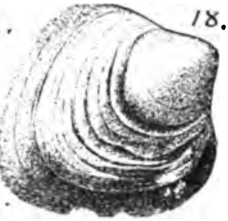
VIII a

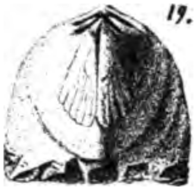


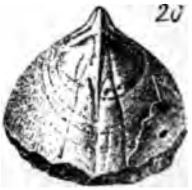


Hall.
Pal. N.Y. IV.
pl. 58 A.
p. 385

VIII a.
Hall.
Pal. N.Y.
1867.
Vol. IV.
pl. 58 A.

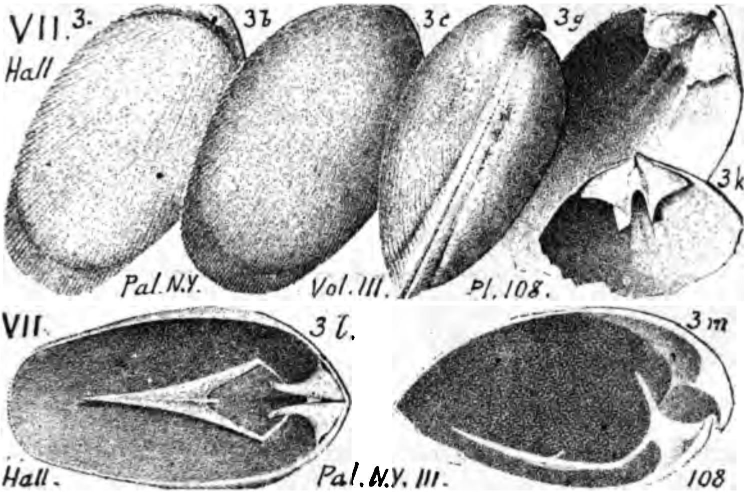




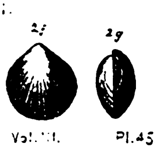


lected figs. 16, 17, dorsal and ventral views of a characteristic specimen somewhat larger than common; 18, unusual, broad, ventral valve; 19, dorsal cast, with muscular scars, dental cavities, etc., 20, ventral cast with scars, and hinge plate impression. Characteristic radiating striæ of *Rensselœria* not observed. If a different genus, Hall proposed the name *Rensselandia.* Found in an *Upper Helderberg limestone* at Waterloo, Iowa.—In Pennsylvania, C. E. Hall, collected specimens at Marshall falls, Monroe Co., in 1875, which he referred doubtfully to this species of J. Hall. *VIII a.*

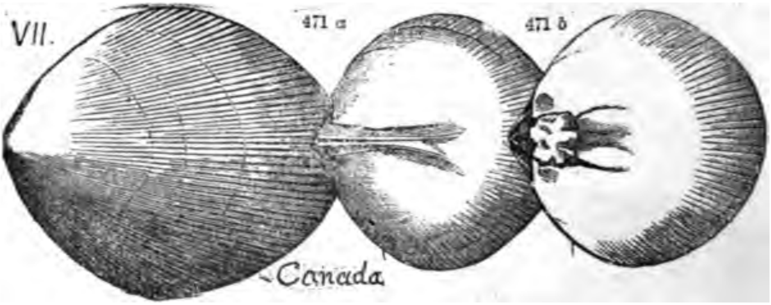
Rensselæria marylandica, Hall. Pal. N. Y. Vol. 3, 1859, page 461, plate 108, selected figures 3 *a*, *b*, *c*, dorsal, ventral and profile views; *g*, ventral interior, showing its teeth, dental plates, and muscular scar; *k* upper part of inside of dorsal valve showing its broad hinge plates, bases of crura, raised middle process, and hole (foramen) below the apex; *l*, *diagram* (theoretical drawing) of the inside of a dorsal valve, showing hinge plates, dental sockets, foramen, crural processes and crural plate; *m*, *diagram* of long section of shell and internal apparatus for connecting the two valves. Closely resembles *R. ovoides*, so abundant in the *Oriskany sandstone* of N. Y., and may be only a variety; but no graduation from one form into the other has been observed. Moreover *R. ovoides*, so much larger and coarser, is found in the same rock with it, at



Cumberland, Maryland. Also in Huntingdon Co., Pa., at Orbisonia and Three Springs; ends of Royer's and Sandy ridges (T. 35; T3, 119; C. E. Hall's list of his collections in 1875. Proc. A. P. S. Jan. 5, 1876.) *VII.*

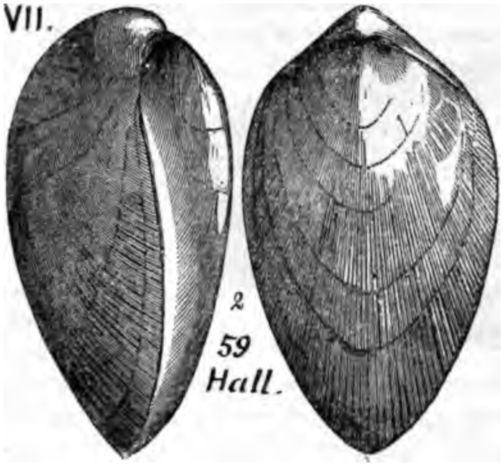


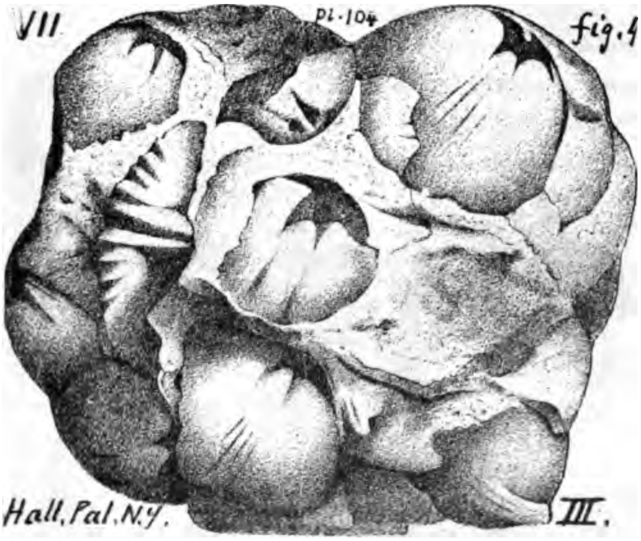
Rensselæria mutabilis. (*Meganteris mutabilis.* Hall, 1857, 10th An. Rt.; Pal. N. Y. Vol. 1, p. 254, plate 45, figs. 2 *f*, 2 *g*, ***natural size.*** ***Low. Held.***) In Perry Co., Pa., Clark's mill, 2¼ m. N. W. of New Bloomfield, Claypole's spec. 6–9 (OOO, 11800, six small specimens, some of them in fair condition. G. B. S); also, 12910? From ***Lower Helderberg upper shales***, *VI.* In Pike Co., found by Dr. Barrett in his "trilobite ledge" (G6, p. 132, 134) both in White's ***Stormville shales*** and *Stormville limestone.* *VI.*



Rensselæria ovalis, Hall (*Meganteris mutabilis*) 10th Regents' Report, 1857. *Lower Helderberg.* *VI.*—Geology of Canada, 1863, page 562, fig. 471 *a*, ventral valve; *b*, mould of the interior; *c*, mould of interior of dorsal valve. ***Oriskany sandstone.*** *VII.*—In Pennsylvania it is abundant in the outcrops of the ***Oriskany*** around Montour's ridge on the N. Br. Susquehanna. (G7, pp. 86, 297, 310, 372; and Claypole's spec. 95–12 (OOO, 12364, ***Merista lata?*** G. B. S.) from Grove Bros, quarry. Also, in Huntingdon Co., casts in the upper beds, at the Car Works, West Huntingdon; and at Orbisonia and Thre Springs (T3, pp. 119, 259.) Also in Bedford Co., Hyndma Section, abundant in beds 50′, and 104′ to 168′ below the to of the *Oriskany* (T2, 86, 103, 104.) *VII.*

Rensselæria ovoides. (*Terebratula ovoides*, and *T. p ovalis*, of Eaton, Text Book of 1832; *Atrypa elongata*, Conr Ann. Report N. Y. 1839, p. 63; *not* the *Pentamerus elongatu*

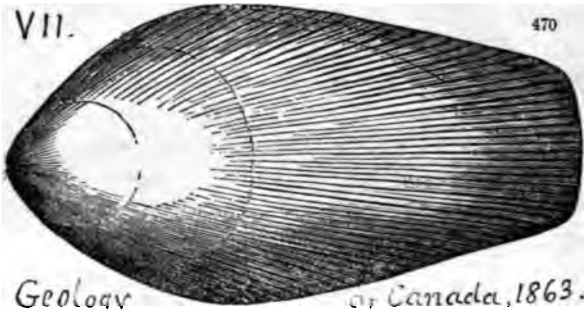




Vanuxem, Geol. Third Dist. N. Y., 1842, page 123, fig. 28, 2; *Atrypa elongata*, Hall, Geol. Fourth Dist. N. Y. 1844, page 148, fig 59, 2; *Meganteris ovoides*, Hall, 1856, 1857; Rogers, Geol. Pa., 1858, page 826, fig. 649; *R. ovoides*, Hall, Pal. N. Y. Vol. 3, plate 104, fig. 4, giving a good idea how colonies of these shells were piled up in the sandy deposits of the *Oriskany*, *VII.* Geol. Canada, 1863, fig. 470, a ventral valve. In Pennsylvania on the Delaware river, found in White's *Oriskany shales* (G6, p. 123, 124.) In Huntingdon Co., vast numbers occur in spots along the Sand Ridge east of Mapleton (T3, p. 274; OOO, p.

169, 26 specimens of various sizes, nearly all casts, very few showing traces of striæ; OOO, p. 208, spec. 701–6,–7,–13, twenty specimens; also at Orbisonia and Three Springs (T3, p. 119; OOO, p. 208, 209, specimens 701-6,-7,-13, twenty; 702-5, -20, three; 703–9, with *Orthis hipparionyx;* 703–10, with markings not shown on the other casts; 703–11, three.) In Centre Co. (T4, p. 431.) In Perry Co., Pisgah hill specimens 12,103, probablythis species; other casts 12,104, may be small individuals, but look like *R. suessana.* G. B. S.) *VII.*

VII.

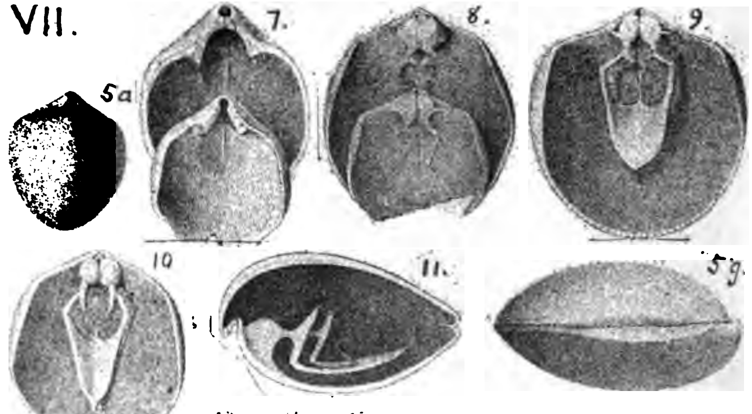


Geology of Canada, 1863.

Rensselæria ovoides, —— Variety. Specimens 12,874, 12,875, 12,876, 12,882 (OOO, p. 141, spec. 59–10. Simpson.)

Rensselæria suessana (*Meganteris suessana*) Hall, 10th Report, 1857; Pal. N. Y. Vol. 3, 1859, page 459, plate 107, figs. 1 to 15; selected figs. 5*a*, small dorsal valve of usual or prevailing form; 5*g*, profile of full grown specimen; 7, interior of two ventral valves, one preserving the deltidial plates, the other not; 8, interior of two dorsal valves, one showing the

VII.



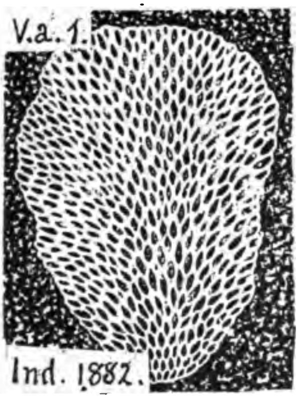
Hall, Pal. N.Y. Vol. III, p. 459, pl. 107.

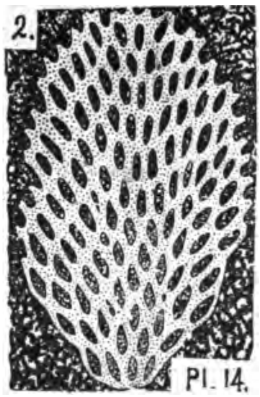
hinge plates in their usual form, the other (upper) having them much thickened, the crura diverging at their origin, the other not; 9, dorsal, with hinge plates, dental fossets, foramen, crura, and crural plates, and appendages; 10, similar, but with hinge plates thickened and rounded, and crura branching near the base; 11, diagram section of two valves joined, to show crura and appendages (to support the breaking apparatus.) Cumberland, Md., in the *Oriskany sandstone*. *VII.*—In Bedford Co., Pa., on Will's creek; numerous in bed 35 of Stevenson's Hyndman section (T2, 86, 103) 50′ below, and bed 39 104′ to 168′ below top of *Oriskany sandstone.* In Centre Co. (T4, 431.) In Perry Co., Claypole's collections at Pisgah hill (OOO, p. 141) are seven specimens marked 59–6 (12104) nearly all casts, probably *Rensselæria*, most nearly resembling casts of *R. suessana*, but they may be only small individuals of *R. ovoides.* Also eighteen marked 59–9 (12,107) of which the same can be said (no *spir. mucronata* visible); also 50–19 (12114) ditto. (G. B. Simpson, 1889.) *VII.*

Rensselæria portlandica, Bill. Proc. Port. S. N. H. Vol. 1, 1863. (S. A. M.)—*VI.*

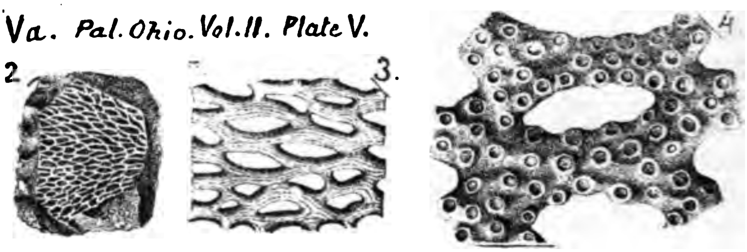
Reptaria stolonifera, Rolle, 1851, Leonhard and Brown, Neues Jahrb., p. 810, *Hamilton* (S. A. Miller, 1889.)—In Penn. collections, spec. 801–11 (this *bryozoon* incrusting an *Orthoceras constrictum*) from Marshall's falls, Monroe Co., Pa., examined by G. B. Simpson, 1889. (OOO, p. 210.) *VIII c?*

Retepora angulata: Hall (1852, Pal. N. Y. Vol. 2, p. 49, Clinton (Collett's Indiana Geo. Report of 1882, page 269, plate 14, fig. 1, portion of bryozoon frond; fig. 2, a part of it *enlarged* to show the interstitial smaller pores. (Van-Cleve de-


V.a. 1.
Ind. 1882.

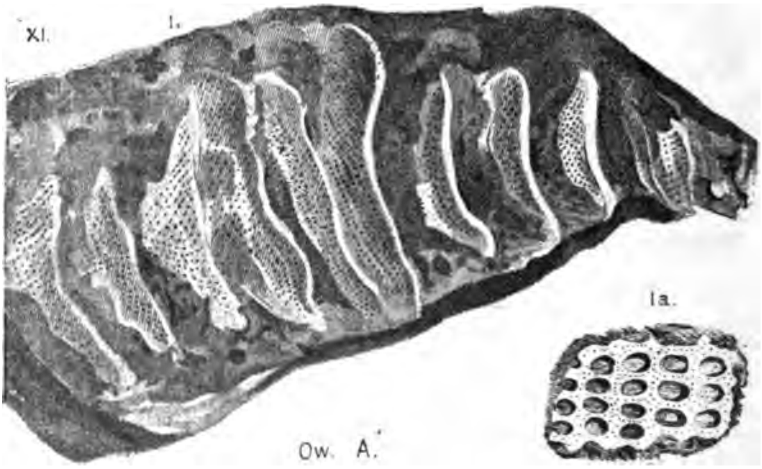


scribed the whole form of the frond as cup-shaped. *Clinton formation* at Dayton, Ohio. See also Pal. Ohio, Vol. 2, 1875,


Va. Pal. Ohio. Vol. II. Plate V.
2
3.
4

page 111, plate 5, fig. 2, *natural size*, bit of frond; 3, enlarged striated surface; 4, much magnified cell, etc. But this may be different from *R. angulata* (which has angular ridges between the pores, and its pore edges are not raised) and may be called *R. daytonensis*. Dayton, O. *Clinton formation*. *Va.*—(**Subretepora angulata.** S. A. Miller, 1889.)

Retepora archimedes. (*Archimedes.* Owen Geol. Wis.



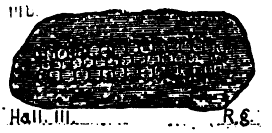
Iowa and Minn., 1852, pl. 4, fig. 1, from beds *f.* near the top of the lower (Keokuk) series of carboniferous limestone on the Mississippi river; 1*b*, magnified piece of the spiral lace work which surrounds the central stem of the coral. See Owens' art. in Silliman's Journal "Regarding human foot marks," 1842, where the first drawing of this famous fossil appeared, and was referred to *Retepora;* if not a *Retepora*, it is a *Gorgonia*, which DeKoninck says can hardly be told apart, because the skin is usually torn off and left on the stone; Goldfuss says that *Gov. repisteria* has such a skin. Owen thought therefore that his fossil might be a *screw Gorgonia. XI.*

Retepora staminea, Rogers' Geol. Pa., 1858, p. 817.. *II c.*

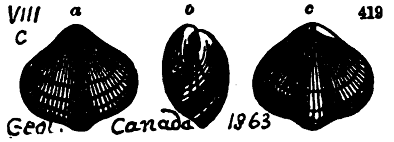
Retepora striata, Rogers' Geol. Pa., 1858. *II c.*

Retepora —— ? In Fellows' collections of 1876, above Tyrone forge Huntingdon Co. OOO, p. 189; spec. 211-7. *II c.*

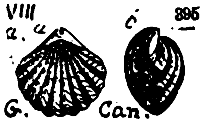
Retiograptus geinitzianus, a graptolite figured by Hall, Pal. N. Y. Vol. 3, 1859, on page 518. *Hudson river strata. III b.*



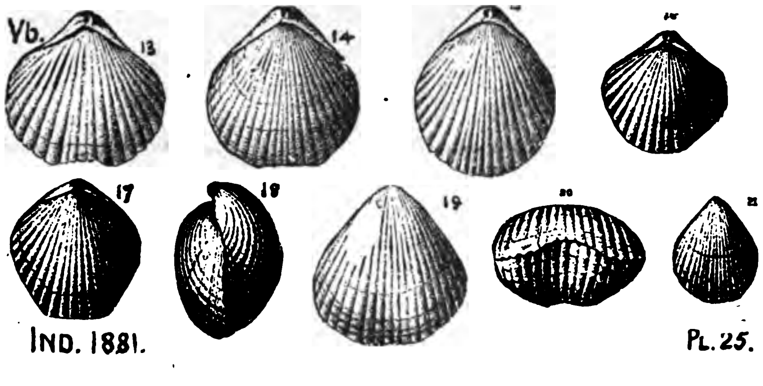
Retzia chlœ. Billings. Geology of Canada, 1863, page 385, fig 419 *a*, ventral valve; *b*, *c*, side view and dorsal valve. *Hamilton formation. VIII c.*



Retzia eugenia, Billings, Canad. Jour. 1861. Geology of Canada, 1863, page 373, fig. 395 *a*, dorsal valve; *b*, side view of the same specimen. *Corniferous limestone formation. VIII a.*



Retzia evax, Hall. From Collett's Indiana Report of 1881,

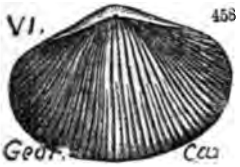


age 302, plate 25, figs. 13–17, dorsal valves, at various ages; 18, profile of 14; 19, ventral valve showing mesial groove; 20, front view of 14; 21, ventral, small, long, mature ? valve with finer plications. *Niagara limestone. V b.*

Retzia granulifera. See **Trematospira granulifera.** *IIIb.*

Retzia mormonii. (*Terebratula mormonii,* Marcou, Geol. N. America, 1858, p 51. *Retzia punctilifera,* Shumard, Trans. St. Louis Acad. Sci. 1858, Vol. 1, p. 220.) Collett's Indiana Rt. 1883, page 136, plate 35, figs. 10, 11, 12, *enlarged one quarter,* belly, back and side views. Widely distributed and easily identified in the *Coal Measures. XIII.*—Note. *The figure will be given in the Appendix.*

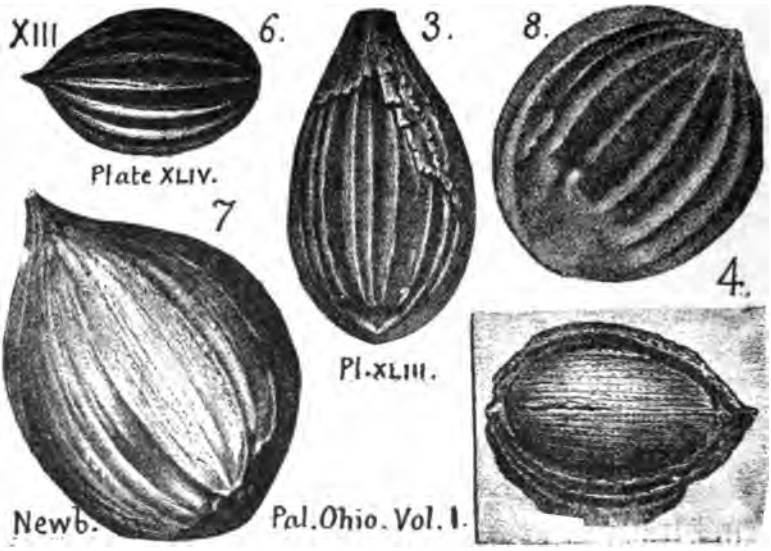
Retzia multistriata, Billings. Geology of Canada, 1863, page 958, fig. 458, surface of the dorsal valve. *Lower Helderberg formation. VI.*



Retzia punctulifera. See **R. mormonii.** *XIII.*

Retzia verneuilliana. See **Eumetria vern.** *XI.*

Rhabdocarpon acuminatum, Newberry. Pal. Ohio, Vol. 1,



1873, page 378, plate 44, fig 7, a large nut, 2¼ inches long by 1½ in. broad; surface nearly smooth, with faint traces of ridges; suspected by Newberry of being perhaps *R. costatus*, with its hull or envelope more or less perfectly preserved; but no proof of it yet. As for Goeppert and Bergers' genus *Rhabdocarpus*, for flattened *nuts not triangular* (*Trigonocarpon*), Newberry includes in it *all* the ovoid, flattened nuts which are in no wise three-sided, regardless of the tree stems and leaves among which they now lie in the *Coal measure shales.* This species was found like most of the others in the lowest coal bed roof, the *Sharon* (Ohio No. 1) *coal*, near the base of *XII.*

Rhabdocarpon amygdalæforme, Goeppert and Berger. De Fruct. 1884. *Coal measures.* Lesquereux in Geol. Pa., 1858, 877; Coal Flora, 1880, p. 581, plate 75, figs. 27, 28. Found in one of the low (*XII*) anthracite beds at Trevorton, Pa. Also, at the base of *XII*, Pittston, Pa. Lacoe's collection (G7, 40). Also, in roof of *Sharon coal*, Mercer Co., Pa., near base of *XII.* (Q3, 160.) Also, in *Darlington coal* floor, Beaver Co., Pa. (Q, 55.) Also, in *Coal No. 3* of the Illinois series.—*XII, XIII.*

Rhabdocarpon apiculatum, Newberry, Pal. Ohio Vol. 1, 1873, page 377, plate 44, fig. 6 (given in the group above), an elliptical nut, with about a dozen nearly equal, rounded ridges, strong mid-way of their length and dying down toward both ends; possibly the same as *R. costatum*, as we do not yet know how much the form of such a nut might have varied. In fact both may be mere varieties of *R. carinatum.* All three fell from trees that grew in the same forest, for all three are found in the roof shale of the *Sharon coal.* (Supposed by Lesquereux to be only the decorticated condition of *R. carinatum*· Coal Flora, 1880, p. 579.) Tallmadge, Ohio, near bottom of *Conglomerate*, *XII.*

Rhabdocarpon arcuatum. See **Carpolithes arc.** *XIII.*

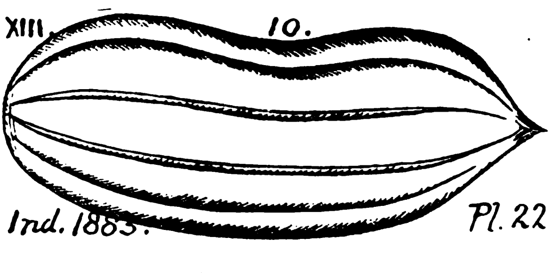
Rhabdocarpon bochsianun, quoted by White (Q, 55) as found by Lesquereux in the *Darlington coal floor*, Beaver Co., Pa. *XIII.*

Rhabdocarpon carinatum, Newberry, Pal. Ohio, Vol. 1. 1873, page 376, plate 43, fig. 3 (in the group of figures given above), a nut with many rounded ridges, and, as shown by some specimens, having had a hull or covering, portions of which may be noticed in the figure. (Supposed by Lesquereux to be the perfect form of *R. apiculatum.*) Roof of *Sharon coal* in Summit and Mahoning counties, O. *XII.*

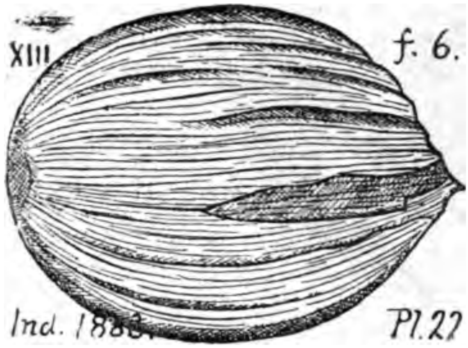
Rhabdocarpon clavatum ? (St.) Gein. Lesquereux, Geol. Ill. IV, 461, pl. 31, f. 11. Coal Flora Pa., 1880, p. 581, pl. 85, figs. 14, 20, from Mazon creek, Ill., and Helena, Ark. *Darlington bed*, Beaver Co., Pa. (Q, 55.) Simpson's figure (1889) of specimen 1026 *a* in Lacoe's collection at Pittston, Pa. *XIII.*

Rhabdocarpon costatum, Newberry, Pal. Ohio, Vol. 1873, page 378, plate 44, fig. 8 (for figure see the group above) a large nut, with numerous keels, every other one strong and sharp, the intermediate ones low and rounded. (Supposed by Lesquereux to be identical with *R. acuminatum*, which better preserves the epicarp, or outer shell. Coal Flora, p. 579.) Youngstown, O., in roof of *Sharon coal* near base of. *XII.*

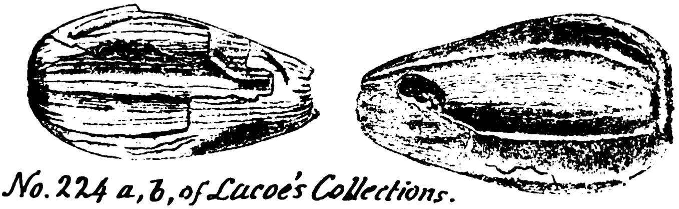
Rhabdocarpon danai, Foster, Annals of Science. Vol. 1854, *Coal measures.* Pal. Ohio, Vol. 1, 1873, page 376, plate 44, fig. 4 (see figure in the group above); a unique specimen of an oblong, compressed, and finely striated nut from the roof shales of the Zanesville, Ohio, coal No. 3; the nucleus surrounded by a broad corrugated margin, in which are visible four or five folds parallel with its edge; badly fractured, giving a poor idea of the fruit. (Newberry.) Pittston, Pa. (Coal Flora p. 580.) *XIII.*



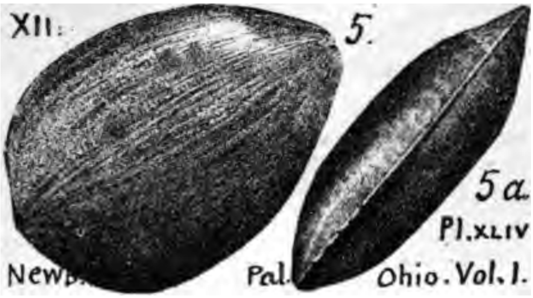
Rhabdocarpon howardi. (Lesquereux Coal Flora of Penn. 1880, page 575, plate 85, fig. 24, from some coal measure sandstone in the south of Ohio.) Collett's Indiana Report of 1883, page 104, plate 22, fig. 10. A fruit perhaps referable to *Trigonocarpon. Coal measures. XIII.*



Rhabdocarpon insigne. (Lesquereux, Coal Flora of Pennsylvania, 1880, page 575, plate 85, fig. 26; a fine specimen of fruit in Lacoe's collection at Pittston, Pa., from the Seneca mine, anthracite coal bed F. Collett's Indiana Rt., 1883, page 104, plate 22, fig. 6.—XIII. Coal Measures, northern anthracite coal field, eastern Pennsylvania. See also in Dawson's Acadian Geology, 1868, p. 460, fig. 173 G, *reduced* in size, an oval fruit, with striated sides, of uncertain affinity, and *Carboniferous age. XIII.*


No. 224 a, b, of Lacoe's Collections.

.**Rhabdocarpon jacksonianum,** Lesq. G. B. Simpson's figures (1889) of specimens, Nos. 224 *a*, *b* (E. 57*a;* E. 57*b*) in W. Lacoe's collection at Pittston, Pa. (*Carpolithes jacksonianus*, Lesq. Geol. Ill. II, 461, pl. 46, f. 4. *Carpolithes sulcatus?* St. Probably the *Trigonocarpon* —— ? Newb. Pal. Ohio, I, pl. 42, f. 9, and 43, f. 15.) Coal Flora, p. 576. plate 85, figs. 17–19. Not rare. Many species in Lacoe's cabinet at Pittston, Pa. from anthracite at Oliphant, Port Griffith and Butler mines; near base of Conglomerate. (G7, 40.) "Two figures are here given of fruits differing considerably in size belonging to the same species which is represented by many well preserved specimens from the same locality. Habitat, Dolomite, near Birmingham, Ala., and throughout the anthracite and bituminous coal fields from the Subconglomerate to the Middle Coal Measures." (Letter of Lacoe, Oct. 15, 1889.) *XII. XIII?*



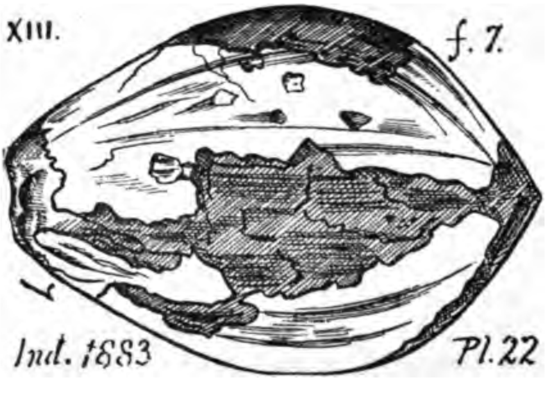
Rhabdocarpon læve, Newberry, Pal. Ohio, Vol. 1, 1873, page 377, plate 44, fig. 5, 5*a*, a fine flat nut from the *Coal measure conglomerate* at the Cuyahoga falls, Ohio, the broad side of which looks like the largest specimens of *Trigonocarpon hildrethi*, but wants its three strong ridges and triangular section. (Related to *R. insigne;* Spec. from Indiana, between 4 and 5 inches long. Lesq. C. Flora. p. 580.) *Pottsville conglomerate*, *XII.*

Rhabocarpon latemarginatum, Schmp. (*Carpolithes platimarginatus*, Lesq. Geol. Ark. II, 912, pl. 4, fig. 6.) Found by Lacoe in anthracite of Pittston, Pa., near base of *Conglomerate.* (G7, p. 40.) *XII.*

Rhabdocarpon lescurianum, proposed for *R. insigne*, preoccupied by Dawson.

Rhabdocarpon lineatum. Compare **Cordaicarpon apiculatum.** *XIII.*

Rhabdocarpon mammillatum, Lesq. Geol. Surv. Ill. Vol. 4, 1870, p. 461.—*XIII.*

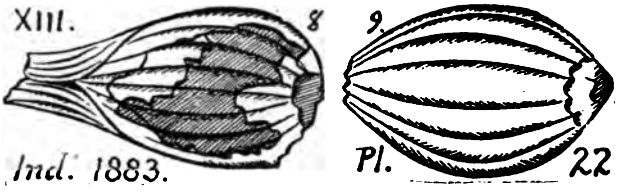


Rhabdocarpon mansfieldi. (Lesquereux, Coal Flora, under *Cordaites mansfieldi*, plate 87, fig. 8, bound between pages 560 and 561.) Collett's Indiana Report of 1883, page 104, plate 22, fig. 7. Not rare at Cannelton, in the Kittanning beds of

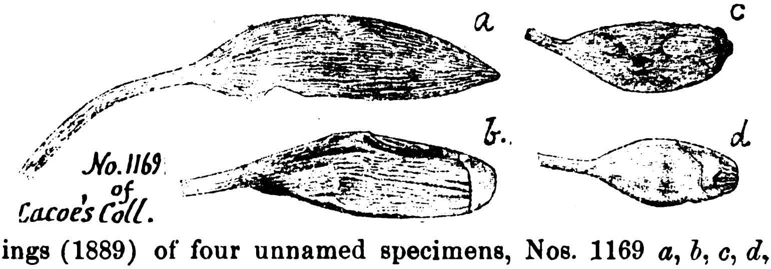
Lower Productive Coal measures. XIII. Three specimens, C 5–9 of White's collection, 1 m. E. of Washington, from a *shale over the Washington limestone*, of the highest bituminous coal measures of S. W. Pennsylvania (OOO, p. 255), are doubtfully referred to this species.

Rhabdocarpon ? minutum, Lesq. Geol. Arkansas, II, 313, pl. 5, f. 8, *a*. Found by Lesquereux in the shale under the *Conglomerate* at Pittston, Pa. (G. 7, 40.) *XII.*

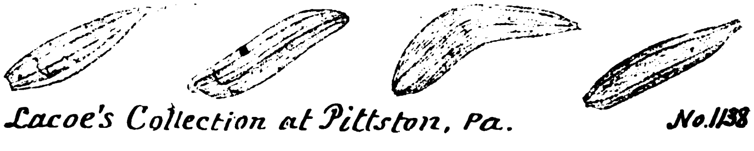
Rhabdocarpon multistriatum. Presl. (Lesquereux, Coal Flora of Pa., 1880, page 578, plate 85, figs. 22, 23. Not rare in coal beds above the Conglomerate (XII) at Shamokin, Pittston etc., anthracite fields, equivalent to the Clarion and Kittanning coal beds of Western Pennsylvania. It is reported found in the Kittanning coal bed at Cannelton, W. Penn. Collett's Indiana Rt. 1883, page 104, plate 22, figs. 8, 9. *Coal measures. XIII.*



Rhabdocarpon (*unnamed.*) Lesq. G. B. Simpson's drawings (1889) of four unnamed specimens, Nos. 1169 *a*, *b*, *c*, *d*, from Alabama, preserved in Mr. R. D. Lacoe's collection at Pittston, Pa.



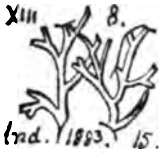
Rhabdocarpon (*unnamed.*) Lesq. G. B. Simpson's draw-



G.B.S. 1138 a, g. of Lacoe's Collection.

ings of six unnamed specimens, No. 1138, in Lacoe's collection from Alabama.

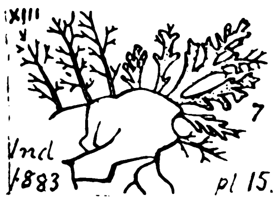
Rhachiopteris squamosa. Lesq. New species. Coal Flora, Additions, 1884, page 838. The genus is Dawson's; see Coal Flora, page 332. The new species of stipes "are probably those of *Pecopteris villosa*, or *Pecopteris squamosa*. *Allegheny series*, Kittanning coal bed, Cannelton, Beaver Co., Pa., where it is not rare. No. 456 of Lacoe's collection at Pittston. *XIII.*



Rhacophyllum adnascens. (*Schizopteris adnascens*, English, Lind. & Hutt.; Geinitz. *Fucoides radians*, Gutb. *Tricomanites admascens*, Gopp. *Rhodea radians*, Presl. *Aphlebia adnascens* Presl. *Hymenophyllites adnascens*, Lesq. Geol. Illinois, Vol. 4; *Rhacophyllum adnascens* Schimper. Lesquereux, Coal Flora, plate 57, figs. 9, 10, 11. Not rare as fragments throughout Middle Coal Measures, but seldom collected.) Collett's Ind Rt. 1883, p. 73, plate 15, f. 8. *Coal measures*, *XIII.*

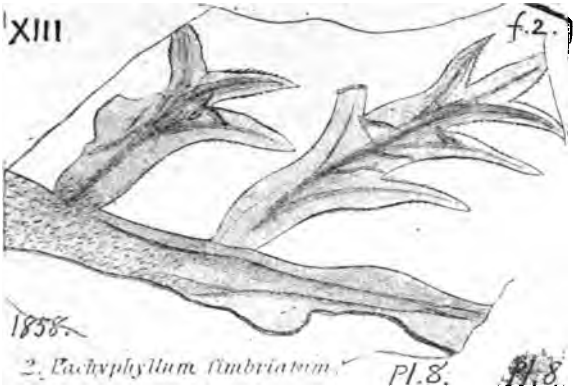
Rhacophyllum expansum, Lesq. Coal Flora, 1880, p. 323, plate 57, fig. 6. Found at Oliphant, Lack. Co., Pa. (Correction in Lacoe's letter, on page 291 of this Dictionary, above. *XIII.*

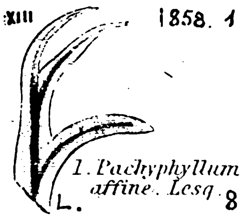
Rhacophyllum corallinum. Lesquereux, Coal Flora, p. 317, plate 57, fig. 4, 4*a*. Mazon creek nodules.—Collett's Indiana Report of 1883. page 73, plate 15, fig. 7, small variable, and as Lesquereux says, show to be sometimes parasitic. *Lower Co* *Xmeasures.* *III.*



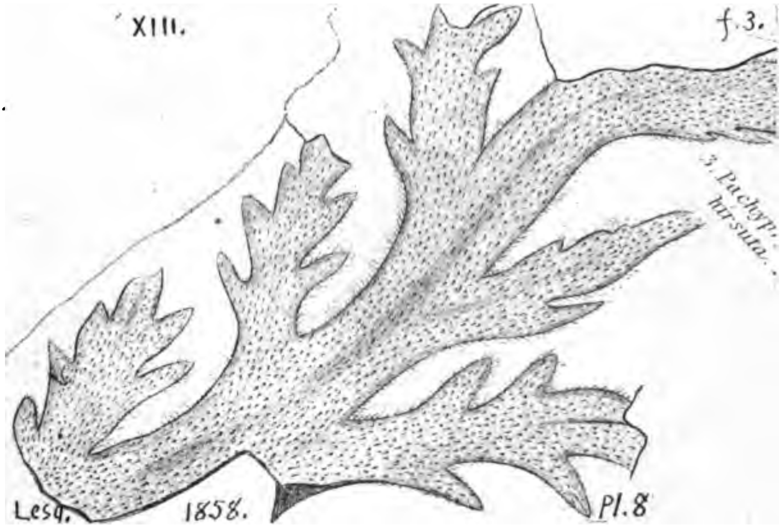
Rhacophyllum filiforme. (*Fucoides filiformis*, Gut Abdr., pl. 1, f. 9, 9.) Lesquereux, in Add. to Coal Flora, 18 page 838, gives description, and identifies specimens No. of Lacoe's collections at Pittston, Pa., from Rhode Island *thracite coal beds*, and also from Kansas. *XIII.*

Rachophyllum fimbriatum (*Pachyphyllum affine.* Lesq. Geol. Pa.,1858, pl. 8, figs. 2 and 8; Coal Flora, 1880, page 818. The *affine* "differs only by the flattened and entirely smooth margins of the divisions;" a single example, small and unreliable; found with *fimbriatum*. and *hirsutum* in the Salem and Gate veins at Pottsville; also in the *lower coal* of Clinton, Missouri. *XIII.*

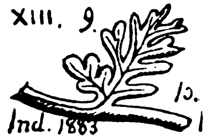




Rhacophyllum hirsutum. (*Pachyphyllum hirsutum.* Lesq. Geol. Pa., 1858, p. 863, pl. 8, fig. 3; "nerves obsolete, surface and margins covered with long glandular hairs; a beautiful

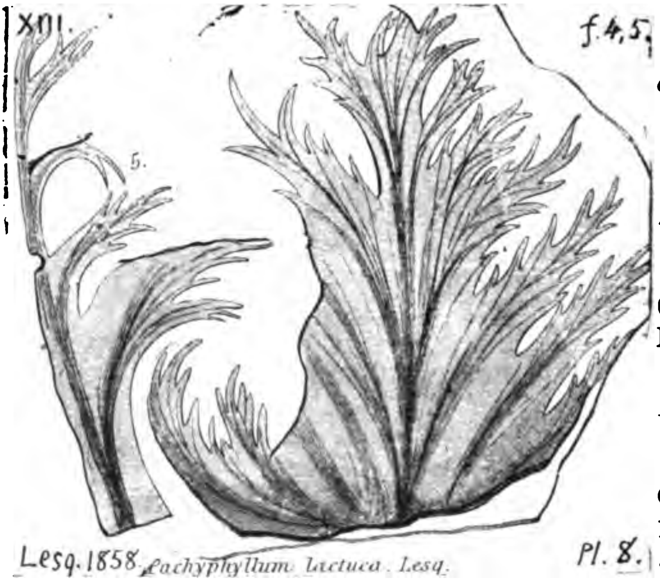


›s; hardly suspected of being a fern were it not for the *rkeria* terns; comparable with *Dictyophyllum rugosum*, ad. and Hutt., but certainly *not a thistle*. Lesq. Also Coal ›ora, 1880, p. 318, pl. 57, fig. 2, from Missouri Coal measures. *alem anthracite vein* at Pottsville, Pa. *XIII.*

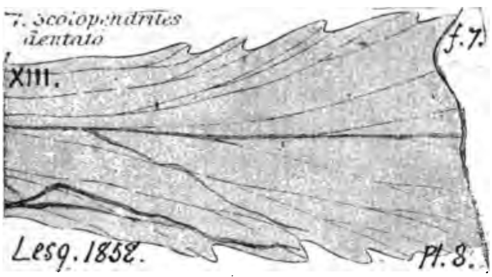


Rhacophyllum inflatum. (*Hymenophyllites inflatus*, Lesq. Illinois Report, Vol. 4, p. 414, plate 16, f. 6, 6*a*. Coal Flora, 1880, page 323, plate 57, figs. 7, 8; unique specimen, simulating a *Sphenopteris;* close to *Hymen. weissii* of Schimper. Roof shale of Duquoin coal, Ill.) Collett Ind. Rt., 1883, plate 15, fig. 9. *Coal Measures. XIII.*

Rhacophyllum lactuca, Stern. (*Schizopteris lactuca*, Presl.; *Fucoides crispus.* Gutb ; *Hymenophyllites lactuca* Lesq. Geol. Ill., IV, 418; *Pachyphyllum lactuca,* Lesq. Geol. Pa., 1858, p 863, plat 8, fig. 4, 5, from Gate Vein, New Philadelphia, Schuylkill C(Pa. Not scarce in the European and American coal measur Lesquereux has seen a fragment with leaves, or wings, tached (?) to a broad common rachis, through which the fo of underlying ferns could be discerned, showing how thir substance must have been. Coal Flora, 1880, p. 315. "W thickness of middle carboniferous measures," but rarely



ble on account of the obscurity of its outline and divisions, on account of its filmy nature. Found also in Mazon creek nodules, Ill., and at Cannelton, Beaver Co., Pa. *XIII.*

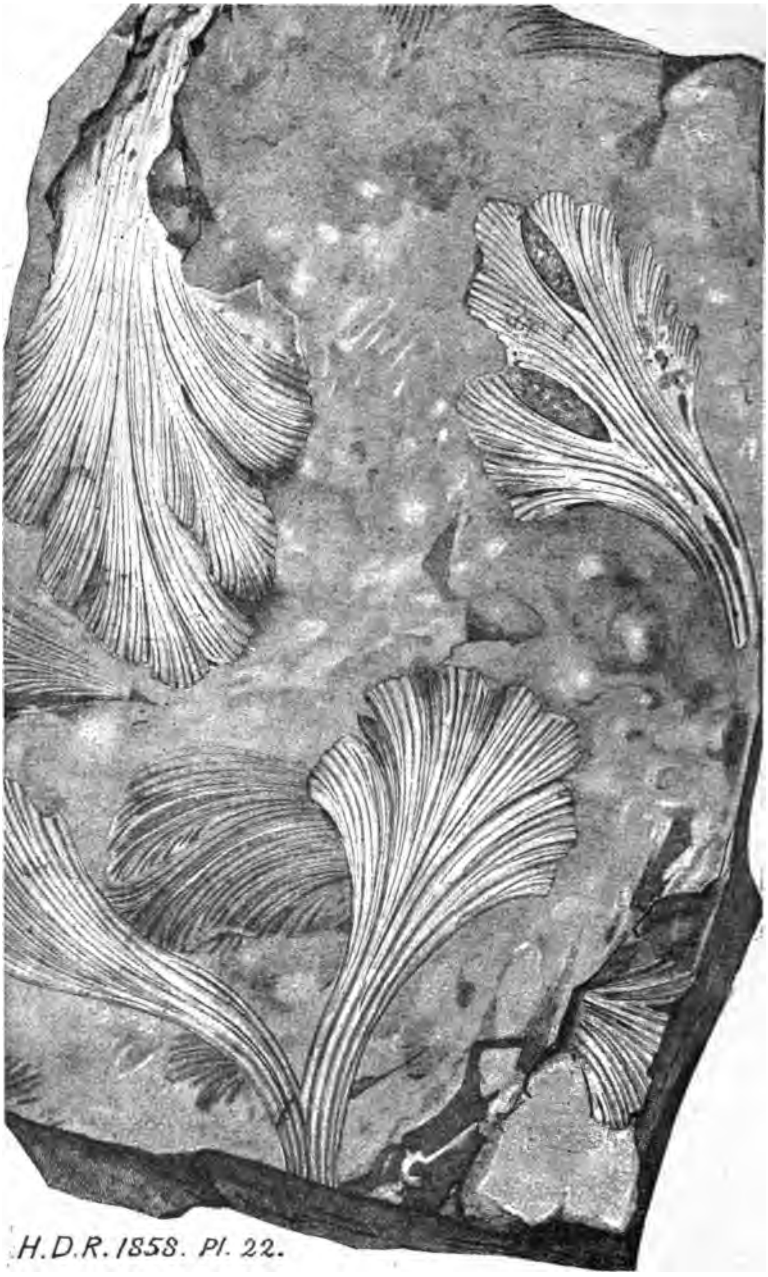


Rhacophyllum ? scolopendrites. Lesq. (*Scolopendrites dentatus.* Lesq. Geo. Pa. Vol. 2, 1858, p. 868, pl 8, fig. 7.) Coal Flora, 1880, page 313; still of uncertain relationship; for Lesq. says he has never been able to find among fossil or recent ferns anything like it; a mere fragment in brittle coal shale; affinity to *Scolopendrium* marked merely by ribbon shape of leaf; to *Rhacophyllum* merely by its veins. *Gate Vein*, New Philadelphia, Schuylkill Co., Pa. Many of the specimens are wrinkled as if by pressure. *XIII.*

Rhacophyilum truncatum ? Lesq. Coal Flora, 1880, page 311, plate 50, fig. 7. Instead of this figure I give the fine form on plate 22 of Geol. Pa., 1858, described p. 830, as "now and then met with" in the *Catskill* (*Ponent*) *No. IX* red rocks of Pennsylvania; pronounced (p. 884) by J. B. Balfour to be a probable gymnos permous plant like *Salisburia adiantifolia.* Link; and by Sir J. W. Dawson, after seeing the specimen in the cabinet of H. D. Rogers (now in Mus. N. H. Soc. Boston). Lesquereux agrees to this, in referring it to his *R. truncatum*, which he found in "Vespertine red shale" in the river bluffs above Pittston, Pa., in company with *Archæopteris minor.* He refers also to C. H. Hitchcock's specimens of *Cyclopteris brownii* from the Devonian of Maine. *X.*—Note. *For figure see page 874.*

Rhaxella perforata, Hinde. Q. J. Geol. Soc. Lond. Feb. 1, 1890, Vol. XLVI, page 60, plate 6, fig. 1, *natural size*, a fine specimen of sponge (quite free from matrix) in the museum at York, England, from the *Lower Calcareous grit* of Scarborough (*Jurassic*, *Middle Oolite*); figs. 2, *nat. size*, showing slit structure; f. 3 (X 2) section; f. 4 (X 20) section; f. 5,

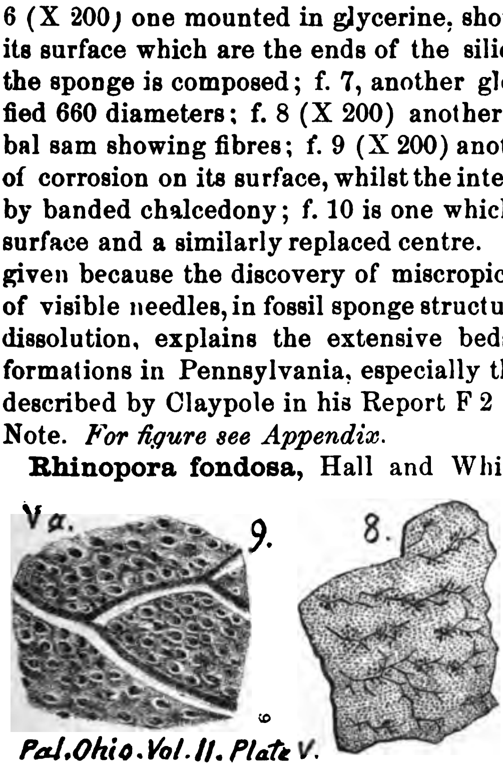
(*Rhacophyllum truncatum. See page 873.*)



H.D.R. 1858. Pl. 22.

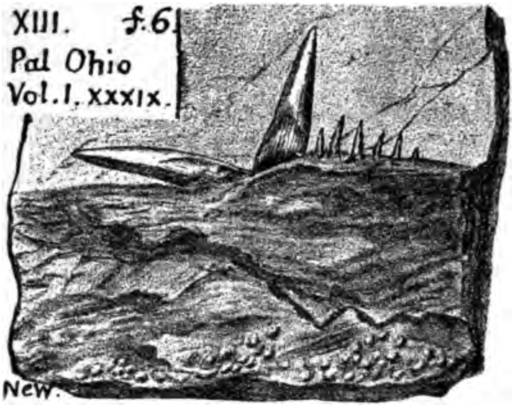
(X 60) globate spicules, got by dissolving the rock in acid; f. 6 (X 200) one mounted in glycerine, showing minute points on its surface which are the ends of the siliceous fibres of which the sponge is composed; f. 7, another globate spinule magnified 660 diameters; f. 8 (X 200) another mounted in Canada balsam showing fibres; f. 9 (X 200) another showing the effect of corrosion on its surface, whilst the interior has been replaced by banded chalcedony; f. 10 is one which shows an unaltered surface and a similarly replaced centre. These figures are here given because the discovery of miscropic globules, as well as of visible needles, in fossil sponge structures, showing also their dissolution, explains the extensive beds of chert in several formations in Pennsylvania, especially the *Chert beds* of *VI*, described by Claypole in his Report F 2 on Perry Co. *VI*—Note. *For figure see Appendix.*

Rhinopora fondosa, Hall and Whitfield. Pal. N. Y. Vol. 2, 1852, page 48. Pal. Ohio, Vol. 2, 1875, page 112, plate 5, fig. 8, *natural size* a fragment, showing the arrangement of spots (maculæ) and grooves on the surface; fig. 9, '*enlargement* of one spot, showingthe clustering of the larger pores. This bryozoon grew over surfaces in thin broad irregular expanses, cellulose only on one face of it. The slightly elevated spots seem to center at the fork of a groove. Much like *R. verrucosa*, Hall, from Flamboro Head, Canada West, from the same *Clinton limestone* as this at Dayton, Ohio; but the grooves are in that species raised lines. *V a.*



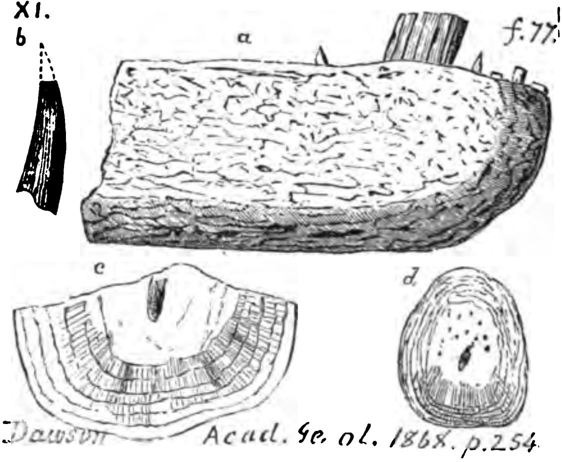
Pal. Ohio. Vol. II. Plate V.

Rhizodus angustus, Newberry, Proc. Acad. Nat. Sci. Phila. Vol. 8, 1857, Pal. Ohio, Vol. 1873, page 342, plate 39, fig. 6, *natural size*, part of jaw with teeth, of one of the Linton, Ohio, *Coal measure* fishes; teeth showing a tendency of barbing at the point, as do those of *Lepidosteus;* folded base of tooth, as usual, gone, leaving only the solid point, about an inch long, entire tooth having been two inches. This is an unusual occurrence of teeth in the jaw; isolated teeth being frequently found, and with them large scales; some of the teeth may belong not to fishes but to amphibious animals; but the scales must be those of fishes, which must also have had large teeth. Ohio *coal bed No. 6. XIII.*

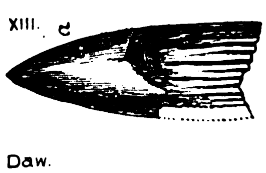


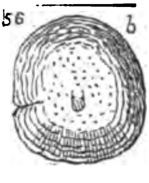
Rhizodus hardingi, Dawson Acad. Geol. 1868, p. 254, f. 77; *a*, part of the fish's jaw; *b*, tooth; *c*,*d*, scales, from Norton bluff, Nova Scotia, *Lower Coal Measures. XI.*

Jaw, Tooth, and Scales of *Rhizodus Hardingi,*

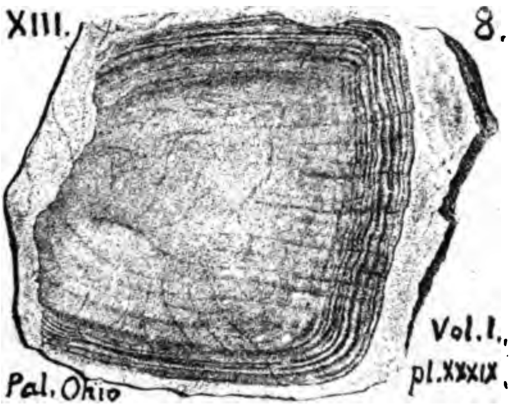


Rhizodus lancifer, Newberry. Proc. Acad. Nat. Sci.





Philada. Vol. 8, 1857. Also, Pal. Ohio, Vol. 1, 1873, p. 342, pl. 39, fig. 9. Dawson's Acadian Geology, 1868, page 210, fig. 56, *a*, tooth, *b* scale; not distinguishable from Newberry's species; teeth in Ohio, not infrequently found detached from the jaw, with large fish scales (*Rhizodus quadratus ?*) Cannel base of Coal No. 6, Linton, O. Joggins section, Nova Scotia, division 4, bed 6, full of fishes of four genera. *XIII.*



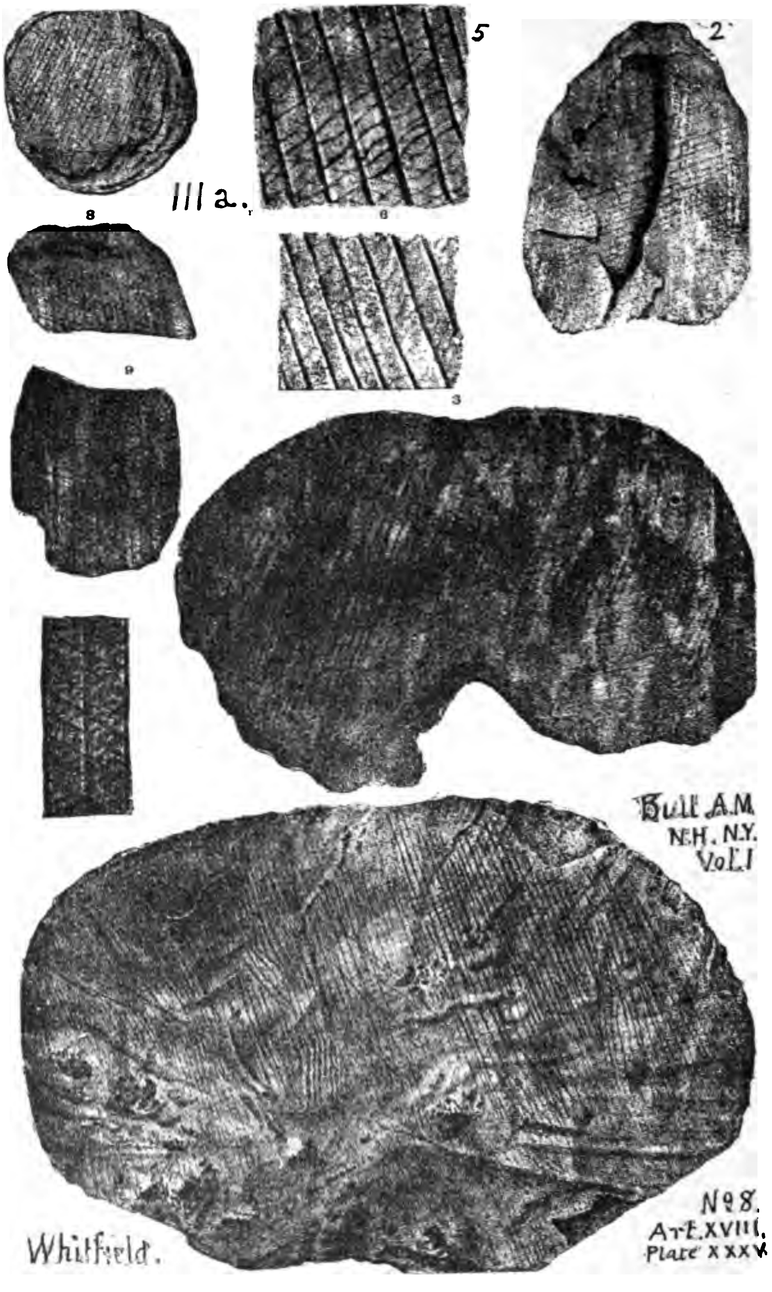
Rhizodus quadratus, Newberry. Pal. Ohio, Vol. 1, 1873, page 343, plate 39, fig. 8, *natural size* of scale of some ganoid fish, thin, squarish, nearly smooth, margins finely striated, and showing concentric lines of growth, central area marked by fine network of threads. Never yet found actually connected with the teeth *R. lancifer*. Distinct species from British *Rhizodus* of Hibbert. — Linton, O. *XIII.*

Rhizodus —— ? Large fish scales, or plates, are occasionally to be collected from the black calcareous shales overlying Stevenson's *Upper Barren limestone* No. III, Washington Co. Pa. (K, pp. 50, 225; K 3, pp. 306, 310.) *XVI.*

Rhizomorpha sigillariæ, (Q, p. 55.) *XIII.*

Rhodia radians. See **Rhacophyllum adnascens.** *XIII.*

Rhombodictya discum, Whitfield. Bull. Amer. Mus Nat. Hist. N. Y., Vol. 1, No. 8, 1886, page 348, plate 35, fig. 1, *natural size*, a sponge frond with distinct threads or rods, comparatively thick substance pressed into the shale so as to imbed edges; probably globular when alive; numerous specimens found in a layer of the Norman's Kill shale, Albany Co., N. Y., only a few feet from the outcrop of the *Graptolite* bed described in Pal. N. Y. Vol. 1, and in 12th, 13th and 29th re-



III a.

Bull. A.M. N.H. N.Y. Vol. I

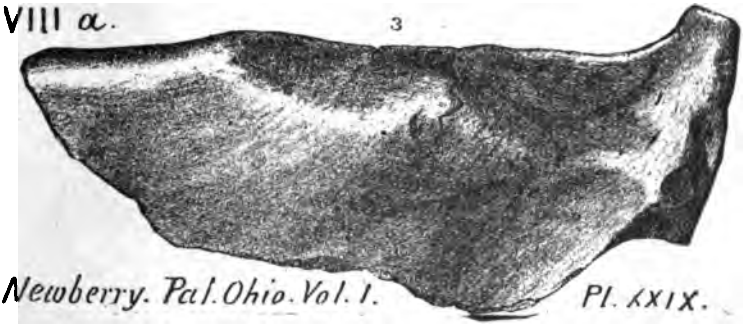
Whitfield.

No 8. Art. XVIII. Plate XXXV.

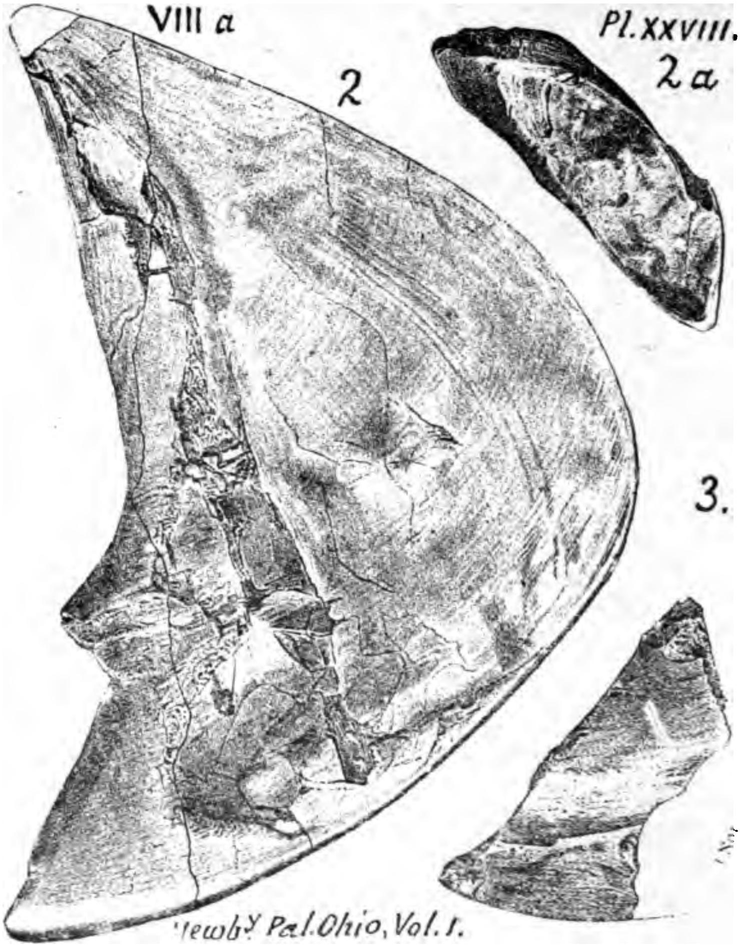
ports on the N. Y. State Cabinet. *Utica slate formation. III a.*

Rhombodictya reniforme, Whitfield. Bull. A. M. N. H. N. Y. (as above) p. 347, plate 35 figs. (*see under R. discum*) 2, small specimen, apparently double; 3, very perfect medium size specimen; 4, large and most perfect specimen found; 5, 6, 7, *enlargements* of surface as seen under different lights. Substance of all the specimens found changed to pyrite, and not over 1-30 inch thick; rods or threads very distinct, long and rigid, 1-16 to 1-50 inch apart, always oblique to the apparent axis; secondary threads somewhat flexuous, finer, closer together, set at various angles from 50° to 80°, never 45°, to the primaries; third still finer series at other angles; the whole a fine net-work. Figs. 8, 9, represent numerous small individuals scattered over and through the shale; possibly fragments; possibly young ones; possibly a variety, *rhombiforme*, Whitfield. Doubtful, whether these bodies are animal sponges, or vegetable sea weeds. "They seem unlike vegetable remains on account of the rigid nature of the frame work, and their pyritous remains; while the carbonaceous, smooth, filmy structure, and shapeless form is somewhat plant-like." *III a.*

Rhynchodus crassus, Newb. Pal. Ohio, Vol. 1, 1873, page 312, plate 29, fig. 3, a lower? mandibular fish-tooth, considerably worn, seen from inside, showing the triturating surface, or chewing crown, thick and strong; one of a number taken from the *Corniferous limestone* quarries at Sandusky, Delaware, and Kelley's island, Ohio; none completely preserved; original form probably not unlike *R. secans*, but broader and stronger and better fitted for crushing than cutting *VIII a.*

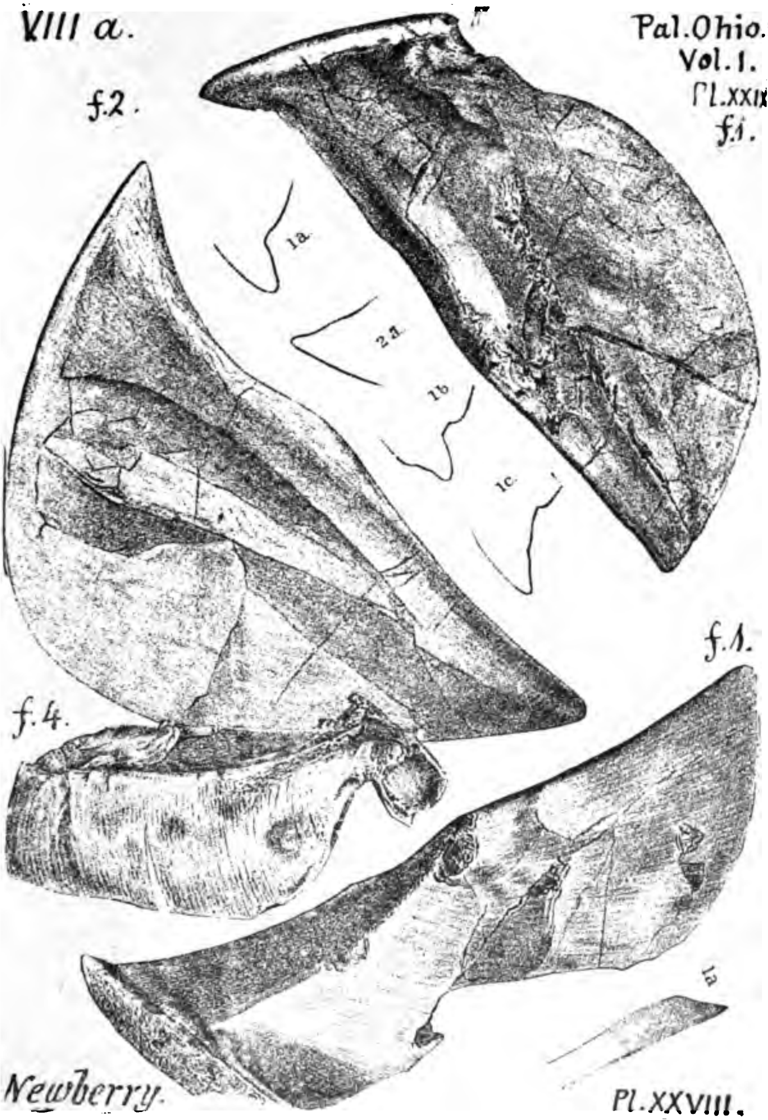


Rhynchodus frangens, Newb. Pal. Ohio, Vol. 1873, page 311, plate 28, fig. 2, *natural size*, outside face of left? lower? mandibular tooth of a huge fish, which, among a number of specimens, is so perfectly preserved as to retain the thin shelly outside over part of its side; 2 *a*, the triturating surface of the broad part of the edge of fig. 2; 3, the inside face of the forward part of the crown of another specimen tooth. Microscopic structure like that of *Cochliodus*, *Psammodus*, etc., a netted tissue of tubes wearing so as to leave a rough grinding surface during the animal's life; so like Buckland's *Chimæra town-*



sendii (Proc. Geol. Soc. Lond. II, p. 206) as to suggest generic identity. *Corniferous limestone.* *VIII a.*

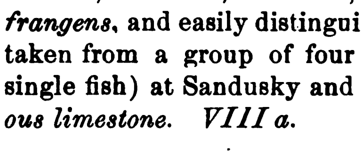
Rhynchodus secans, Newberry. Pal. Ohio, Vol. 1, 1873, page 310, plate 28, fig. 1, *nat. size*, upper ? tooth, worn cutting



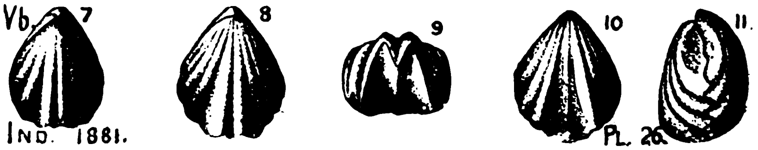
edge; 1 *a*, vertical section, ⅓ distance from front; fig. 4, tooth?; plate 29, fig. 1, upper, 2, lower mandibular teeth; 1 *a*, outline of forward angle, worn by use: 1 *b*, *c*, other forms of same; 2 *a*, outline forward angle of another tooth somewhat worn; smaller, narrower, smoother, less thick and massive than *R. frangens*, and easily distinguished by the cutting edge; 1 and 2 taken from a group of four found together (belonging to a single fish) at Sandusky and Delaware, Ohio, in the *Corniferous limestone*. *VIII a.*

Rhynchonella abrupta, Hall, 10th Report, N. Y. State Mus. p. 68; Pal. N. Y. Vol. 3, 1859, 1861, page 228, plate 31, fig. 3, *a*, *b*, dorsal and ventral valves of a well marked specimen; *c*, *d*, front and hinge view of another. (*See Appendix.*) Perhaps an extreme variety of *R. nucleolata* (Hall.) In N. Y. in shaly limestone of *VI.* In Pennsylvania, Perry Co., 3 m. E. of Ikesburg, Spec. 12713 (wrongly marked *Eatonia medialis*, Van. in OOO, page 166. It is closely allied to *R. vellicata*. G. B. S.) *Lower Helderberg. VI.*

Rhynchonella acadiensis, Davidson. Dawson's Acadian Geology, 1868, p. 295, fig. 94, *natural size*, and *magnified;* founded on two specimens only from the *Carboniferous shell limestone* of Brookfield, Nova Scotia; quite distinct from the young of *R. pugnus*, and *R. pleurodon*. (Davidson, in Dawson.)—*XIII ?*

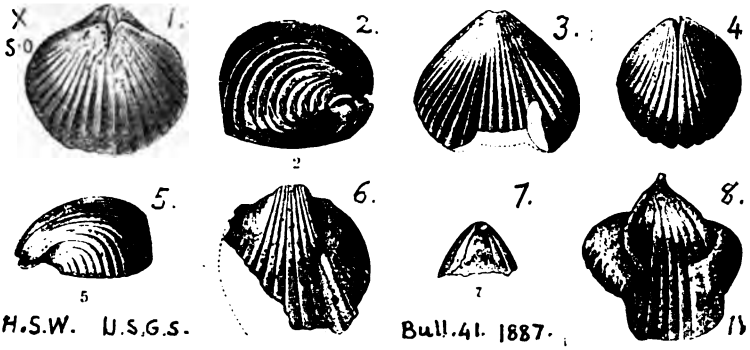


Rhynchonella acinus, Hall. From Collett's Indiana, 1881, page 306, plate 26, fig. 7, *enlarged* 4 *times*, back valve of regularly ovate specimen; fig. 8—11, *enlarged*, back, front, belly, and side view of a somewhat larger specimen, of the common kind. *Niagara*, *V b.*



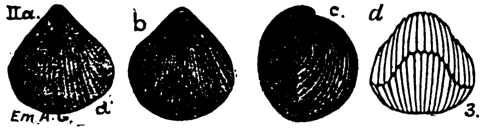
R. acutiplicata, Hall. *R. acutirostris*, Hall. *R. æquivalvis*, Hall. *R. æquiradiata*, Hall. *R. ainslæi*, Winchell.

Rhynchonella allegania, H. S. Williams. Bulletin No.

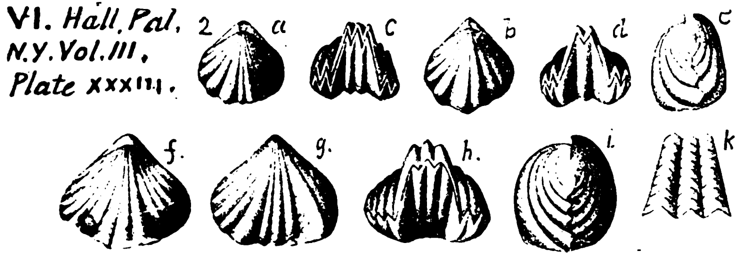


41, U. S. Geol. Sur. 1887, page 87, plate 4, fig. 1, dorsal view of interior impression; 2, side view of same; 3, gutta percha cast of ventral valve; 4, dorsal interior of another specimen; 5, side of same; 6, ventral interior impression; 7, showing deltidium, beak and foramen, gutta percha cast; 8, impression, somewhat distorted, of inside of ventral valve. All from *Sub-Olean (Ferruginous sandstone) conglomerate formation* (top of *Pocono*), at Little Genesee, Allegany Co., N. Y. *X.*

Rhynchonella altilis. (*Atrypa altilis*, Hall, Pal. N. Y., Vol. 1, 1847, Chazy.) Emmons, A. Geol. I, ii, 1855, 192, plate 3, fig. 30; the ventral beak curved over the other; about 24 equal folds, 8 of them in the middle groove. *Calciferous upper*, and *Chazy*. *II a, b.*



Rhynchonella altiplicata, Hall. Pal. N. Y. Vol. 3, 1859,



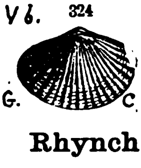
page 231, plate 33, selected figs. 2 *a*, *b*, *c*, *d*, *e*, a small individual; *f*, *g*, *h*, *i*, a larger one; *k*, *enlarged* surface. *Lower Helderberg.*—In Huntingdon Co., Pa., four fragments were got by C. E. Hall, in the field back of the sand quarry near Rock Hill furnace, Orbisonia (OOO, p. 205, spec. 602–3). But, in Tioga Co. Sherwood's spec. 854–10, was got from *Upper Chemung strata*, and assigned to this species by C. B. Simpson, 1889. If this determination be correct, then this species in Pennsylvania ranges from *Lower Helderberg* up to *Chemung*. *VI* to *VIII g*.

Rhynchonella anticostiensis, Billings, Pal. Foss. Vol. 1, 1862. Geol. Canada, 1863, page 211, fig. 212, *a*, dorsal valve; *b*, side view; *c*, ventral valve. *Hudson river* (*Loraine*) *formation* in the Gulf of St. Lawrence. *III b*.

Rhynchonella bidens ? *Terebratula bidentata*, Dalman, Hisinger, etc.: *T. decemplicata*, Murchison, Sil. Syst.; *Atripa bidens*, Hall. Pal. N. Y. Vol. 2, 1852, page 69, plate 23, figs. *a*, *b*, ventral valve of two specimens of different age; *c*, *d*, front and profile of the larger one; from the *Clinton* at Lockport, N. Y. This species closely resembles the much older *Trenton* species *Atrypa dentata*, differing from it in having a shallower sinus, less raised in front, and in having 5 or more folds on each side, instead of 4. "They may readily be confounded on casual examination." (Hall.) In Pennsylvania, doubtfully recognized by C. E. Hall, among his collections at McKee's fossil ore bank, Ferguson Valley, Mifflin Co., in shales over the ore bed. (OOO, p. 104, spec. 501–37.) *V a*.

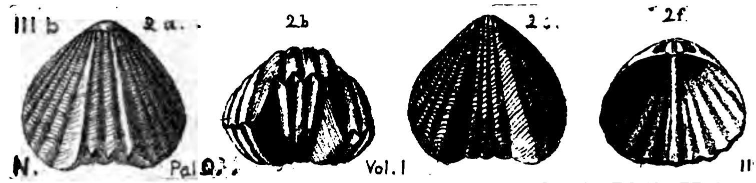
V a, Clinton.
Hall. Pal. N.Y. II.
p. 69, pl. XXIII.

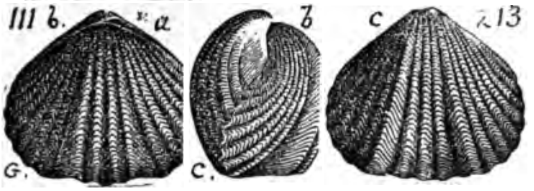
Rhynchonella brevirostris, Hall. (*Terebratula brevirostris*, Sowerby, 1839.) *Pentamerus brevirostris*, Sowerby, 1839, S. A. Miller.) Geol. Canada, 1863, page 315, fig. 324. *Niagara limestone*. *V b*.



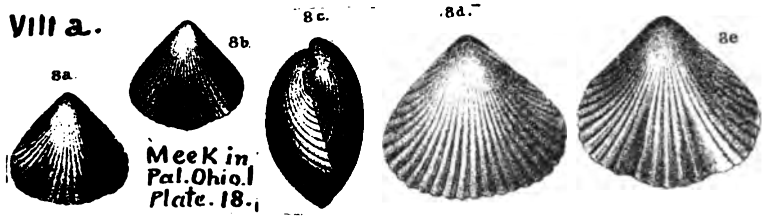
Rhynchonella camura, Hall. Figure given in Geology of Canada, 1863, page 315, fig. 322, as from the strata beneath the *Niagara limestone* of Upper Canada. *Clinton*. *V a*.

Rhynchonella capax (*Atrypa capax;* Conrad. Jour. Ac. N. S. Phil. Vol. 8, 1842.) *Hudson river group.* Geol. Canada, 1863, page 211, fig. 213 *a*, dorsal valve; *b*, side; *c*, ventral valve. Pal. Ohio, Vol. 1, 1873, page 123, plate XI, figs. 2 *a* to *f*.—In Pennsylvania, Huntingdon Co. Tyrone forge (OOO, p. 189) Spec. 211-1 *b*, -3*a*, -4*a*, -5, -7, -8, -9, from *Trenton limestone.* Also, in Bedford Co., on Chambersburg turnpike, Evitt's gap, in a shale parting in the *Medina red formation* (T2, 92, 166), proving conclusively the absence of the *Oneida* from that region. (J. J. Stevenson.) *II c; III b,* up into *I V b.*—(*A. increbescens.*)





Rhynchonella carolina, Hall. (*Stenoschisma carolina,* Pal. N. Y. Vol. 4, 1867, p. 337, plate 34, f. 14 to 19.) Pal. Ohio. Vol. 1, 1873, p. 196, pl. 18, f. 8 *a*, *b*, dorsal and ventral valves; 8 *c*, *d*, *e*, dorsal ventral and profile views of a larger individual, but the mesial fold in *d* should be more defined; from Columbus, Ohio; some one-third larger than those from New York; resembles *R. ? laura,* Billings (*Leiorhynchus multicostata,* Hall), or rather some of its figured varieties. *Corniferous limestone. VIII. a.*


VIII a.
8a
8b
8c
8d
8e
Meek in Pal. Ohio. I Plate. 18.

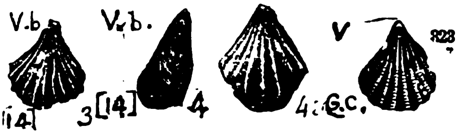
Rhynchonella congregata. See **Stenoschisma congregatum.** *VIII c.* NOTE.—OOO, p. 147, Spec. 78 C5 (12,258), from RR. cut, 1 m. S. of Selinsgrove, Snyder Co. Pa. *Hamil-*

ton yellow sandstone filled with *Chonetes* (*?*) but no *Rhynchonellas* visible. Specimens 12,980, two, contain several. No. 12,982, a slab from *Chemung* at Leroy, Bradford Co., Pa., has numerous impressions of it. (G. B. S. 1889,) *VIII g.*

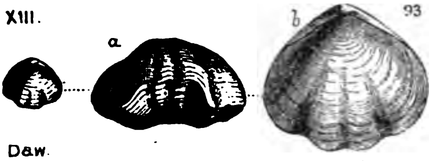
Rhynchonella contracta. See **Stenoschisma contractum.** *VIII g.*—OOO, p. 133, Spec. 11,884, Newport, Perry Co., Pa., much broken away at the margins. *VIII-IX.*—11,997 five specimens, named thus by Whitfield; differently by H. S. Williams; *R. duplicata* by Simpson, from Perry Co. Pa.—*VIII g.* 12,002, similar. 12,007, similar and named by J. Hall, *S. duplicata* in his examination of C. E. Hall's special collection (OOO, p. 175 onward.) 12,188, from Leroy, Bradford Co., Pa., one specimen, has it with *Productella lachrymosa*, Hall. 12,217, Perry Co., E. of Comp's mill, identified by J. Hall as *R. duplicata.* 12,231, Perry Co., near Newport Narrows, is apparently of this species in *Hamilton fossil ore.* *VIII c.*—12,203, from Leroy, partly concealed. 12,485, Perry Co., an impression, *VIII c.* 12,898, near Leroy, *VIII g.* 13,031, Leroy, numerous specimens in good condition on a large thin *Upper Chemung* slab, with *S. mesacostalis.* (Notes of G. B. S. 1889).

Rhynchonella cuboides (*Atrypa cuboides*, Sowerby.) See **Rhynchonella venustula** (Hall. Pal. N. Y., Vol. 4.) *Tully*, *VIII d.*—This shell assumes great importance in Prof. H. S. Williams' paper read (1889) at the Toronto meeting of the Amer. Association. It marks the *Cuboides zone* of Europe, Asia, and eastern N. America. It has not been observed in central and western N. America. If allowed to be contemporaneous everywhere, then, a considerable number of species (including forms under different names very closely allied) appeared *before* the *Cuboides stage* in the English, European, and Russian sections, but not until *after* that stage in the New York sections.

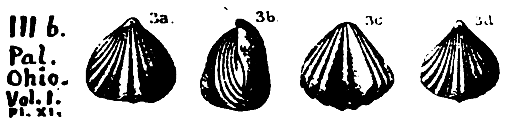
Rhynchonella cuneata (*Terebratula cuneata*, Dalman. Trans. Swedish Academy, 1827.) Geology Canada, 1863, page 315, fig. 323, found in *Niagara limestone* of Upper Canada.



V b. Hall. Geol. 4th District N. Y., 1843, plate figure, 14, 3, 4, and 4*a*. *Niagara*, *V b.*



Rhynchonella dawsoniana, Davidson. Dawson's Acadian Geology, 1868, p. 294, fig. 93, *natural size* and *magnified;* smooth, or with 8 to 12 slightly marked ribs; not rare in a black *Lower Carboniferous limestone* at Lennox passage, Nova Scotia. Not unlike the larger *Camerophora* (*Terebratula*) *superstes*, De Veneuil (Davidson.) *XI?*



Rhynchonella dentata (*Atrypa dentata*, Hall, Pal. N. Y. Vol. 1, 1847, *Hud. River.*) Pal. Ohio, Vol. 1875, page 121, plate 11, fig. 3*a*. Dorsal view of a specimen with the usual *two* muscular plications on the mesial fold; 3 *b*, side view; 3 *c*, ventral, showing the single plication in the sinus; 3 *d*, dorsal view of another specimen showing a rudimentary plication, somewhat raised, on each side of the usual two. The Ohio shells are even more like Davidson's *R. diodonta*, British Sil. Brachiopods, plate 21. New York specimens doubtfully referred to *Trenton limestone;* Ohio and Indiana specimens (from about Richmond) are got from top of *Cincinnati* (*Hudson river*) *slates*. *III b.*

Rhynchonella dotis. See **Stenoschisma dotis.** *VIII c.*

Rhynchonella dubia. (*Atrypa dubia*, Hall, Pal. N. Y. Vol. 1, 1847, Chazy.) Emmons, Amer. Geol. I, ii, 193, plate 3, fig. 23; ventral beak small and incurved; about 30 folds. *Chazy limestone. II b.*

Rhynchonella duplicata. See **Stenoschisma duplicatum,** Hall. *VIII g.* — This seems to be Spec. 12,217, ticketed *Rhynchonella contracta* (J. Hall, 1888), from Perry Co., E. of Comp's mill, *VIII g.*—Also 12,270, from near Bloomsburg, Columbia Co, Also 12,369 and 12,3777, from Stony Brook. N. of Bloomsburg. *VIII g.*

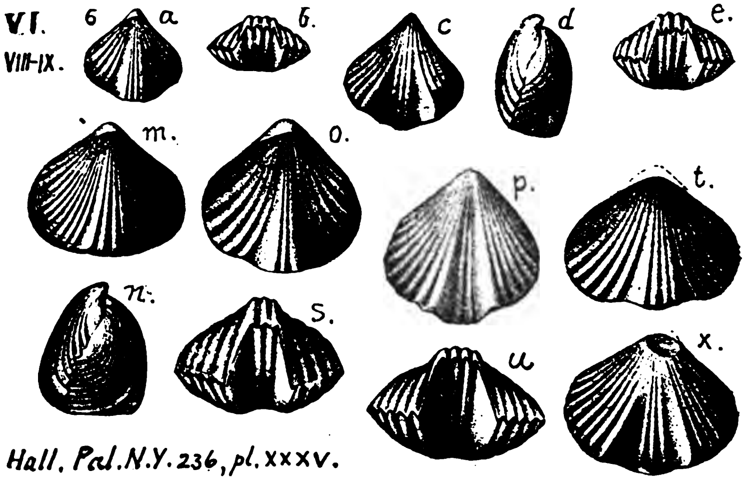
Va
Hall. Pal. N.Y. II: pl. xxiii.

Rhynchonella emacerata. (*Atrypa emacerata.* (Hall. Pal. N. Y. Vol. 2, 1852, page 71, plate 23, figs. 6*a*, *b*, *c*, two individuals, and *enlarged* surface markings; species only known in the upper part of the *Clinton green shale* (Sodus, Rochester, N. Y.); all flattened; shells partially or wholly destroyed.—In Pennsylvania, Perry Co. Waggoner's mill, Centre, Claypole's spec. 12,134 (very doubtful. G. B. S.), from *Clinton strata.* *V a.*

Rhynchonella emma, Hall. Recognized by Claypole in White's spec. 12,292 (*R. emma*, or very near it. J. Hall; *R. eximia*, G. B. S.) from opposite Bloomsburg, Columbia Co., Pa. *Chemung.* *VIII g.*

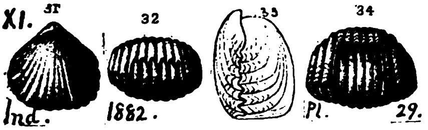
Rhynchonella eximia (*Atrypa eximia.*) **Stenoschisma eximium,** Hall, Geol. Fourth District, N. Y., 1843. Pal. N. Y. Vol. 4, page 348. *Chemung.* Claypole's Spec. 12,292, called *Rhynchonella emma* (OOO, 149, G. B. S. 1889) from Bloomsburg, Columbia Co., Pa. Also 12,134 (?) ticketed *R. emacerata.* (G. B. S.) *VIII g.*

Rhynchonella formosa, Hall, Pal. N. Y. Vol. 3, 1859, page 236, plate 35, selected figs. 6*a* to *e*, views of typical specimens with strong plications; *m* to *x*, specimens presenting the ordi-



nary variations of full grown individuals from the *Pentamerus limestone beds* of *Lower Helderberg.* — In Pennsylvania see Spec. 603–2 (three) collected by C. E. Hall, 1875, near Rock Hill furnace, Orbisonia; Spec. 606–12 (three, not very doubtful) among Fellow's collection at the Hogsback, Walpack bend, Pike Co. — Claypole's numerous specimens 12,930, 12,961 of various sizes.—Found by White in the *Bastard limestone* of the numerous quarries along Montour's ridge (G7, pp. 89, 98, 101, 248, 261, 311, 313) and in the strata over it up to the top of the *Lower Helderberg formation. VI.*—In Huntingdon Co., abundant in the lower 50′ of *VI* overlying the *Waterlime beds* (T, 41; T3, 126; C. E. Hall's Orbisonia collections.) Also, in White's *Bastard limestone bed*, No. 44, of his Coffee run section (T3, 172). In connection with *S. disjuncta*, it is said to mark the *iron ore* bed of the *Chemung-Catskill passage beds* in Huntingdon Co. (T, p. 26).—*VI; VIII-IX.*

Rhynchonella grosvenori. Hall. Trans. Alb. Inst. Vol. 4, 1856. (Whitfield, Bull. 3, Am. Mus. N. H. 1882, plate 6, figs. 31 to 34.) Collett's Indiana Report, 1882, page 331, plate 29, figs. 31, 32, *enlarged twice*, a large rotund specimen; figs. 33, 34 *enlarged three times*, a smaller one. (Hardly distinguishable from the typical *Rhyn. wilsoni.* (Alton, Ill., Spergen Hill, etc., Ind. *Subcarboniferous. XI.*



R. guadalupæ, Shumard, 1858. *Permian.*

Rhynchonella hemispherica, name doubtfully given to two specimens (502–15) in the Pennsylvania collections from the *Clinton* formation, and probably intended for **Leptocœlia hemispherica,** which see on page 330 above. *V a.*

R. heteropsis, Winchell, 1865. *Waverly. X.*

Rhynchonella horsfordi. See **Stenoschisma hosfordi.** *VIII c.* Claypole's four specimens 11,699 (OOO, p. 126) from Barnett's mills, Perry Co., Pa., are too poor and crushed for certain identification (G. B. S.) 12,488 from near New Bloomfield, small, with broken margin, slopes too rapidly from the beak to be *horsfordi;* is more like *R.* (*St.*) *prolifica* (G. B. S.). *Hamilton upper shales. VIII c.*

R. hubbardi, Winchell, 1862. *Waverly. X.*

R. huronensis, Winchell, 1862, *Portage. VIII f.*

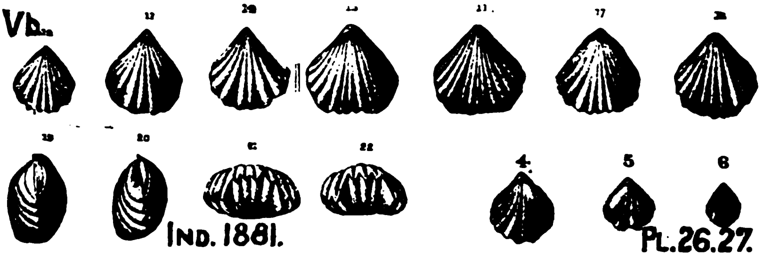
R. hydraulica, Winchell, 1882, *L. Held. VI.*

R. ida, Hartt, 1868, Acad. Geol. *Subcarb. XI.*

R. illinoisensis, Worthen, 1884, *Carbonif. XIII.*

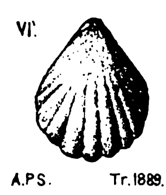
Rhynchonella increbescens, Hall. Geol. Canada, 1863, page 168, fig. 153, *a, b, c.* (S. A. Miller says "a synonym for *Rhynchonella capax.*" *Trenton limestone* of Canada In Pennsylvania, reported by H. D. Rogers, Geol. Pa., 1858. Also, by C. E. Hall, 1876. *II c.*

R. indentata, Shumard, 1859, *Permian.*



Rhynchonella indianensis, Hall. Trans. Albany Institute. Vol. 4, 1863. *Niagara.* Figs. from Collett's Indiana Report of 1881, page 306, plate 26, figs. 12 to 22, a species resembling *R. neglecta* of the New York *Niagara* formation, but larger and more robust, with stronger and rounder folds, and associated with a more finely plicated species which is supposed to be *R. neglecta. V b.*

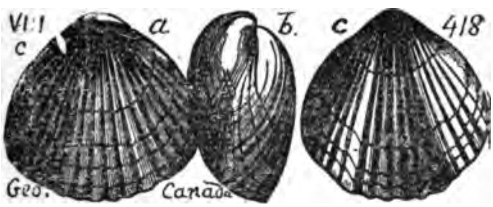
Rhynchonella lacunosa. *For figure* see under *Atrypa lacunosa*, where it is wrongly so named. (Whitfield, 1889.)


VI.
A.P.S.
Tr. 1889.

Rhynchonella (*Stenoschisma*) **lævis,** *new species*, Simpson, Trans. Amer. Phil. Soc. Philada., 1889, page 443, fig. 8, based on Specimen 506–9, collections at Bell's Mills, Blair Co. Pa. — Shell ovate or subtrigonal; valves subequally convex in young shells; in older shells the dorsal valve usually the most gibbous. The width is slightly less than the height; greatest width about two-thirds the length from the beak; margins from the apex to this point slightly curved outward, nearly straight, then somewhat abruptly rounding, and at the base produced in a slight extension. Ventral valve depressed convex, slightly gibbous at about one-third the length from the apex, curving abruptly to the cardinal and antero-basal margins, more gradually to the lower lateral margins, becoming depressed in a shallow sinus, which commences at about one-third to one-half the length from the beak; beak slightly incurved, strongly projecting beyond the beak of the opposite valve. Dorsal valve convex, greatest convexity at or a little below the middle, gradually curving to the apex and cardinal margins, more abruptly to the lateral margins; mesial fold commencing at a little above the middle and often becoming prominent at the front; beak small and nearly straight. Surface marked by from ten to twelve rounded or subangnlar plications, which become obsolete on the upper portions of the valves. The mesial fold is composed of three plications much more prominent than the others. In the sinus there are three plications smaller than the others; the two plications bordering the sinus larger than those on the other portions of the shell. The specimens observed have a length of 9 or 10 mm., and a width of from 7 to 9 mm.; a transverse section broadly oval, having a width of 5 or 6 mm. This species is easily distinguished from any other of this formation at present known. The outline is very similar to some of the forms of *R.* (*Stenocisma*) *eximia*, of the Chemung group, but the shell is smaller, the plications of the fold and sinus are fewer and the plications become obsolete on the upper half of the valve. *Clinton.* *V b.*

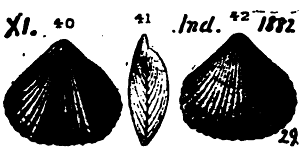
Rhynchonella laticostata. *For figures* see under *Atrypa laticostata*, where they are wrongly so named. (R. P. W., 1889.)

Rhynchonella ? laura, Billings. (A synonym for **Leiorhynchus multicostus.** S. A. Miller) Geology of Canada, 1863, page, 384, fig. 418 *a*, dorsal; *b*, side; *c*, ventral. *Hamilton* of Canada. *VIII c.*

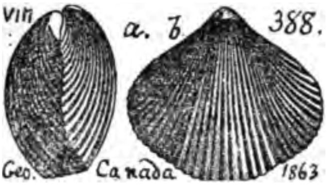


Rhynchonella lepida. Claypole's specimen 12,878, from the *King's mill sandstone*, Perry Co., Pa. (G. B. S.) *VIII–XI.*

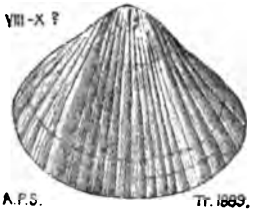
Rhynchonella maera. Whitfield, Bull. 3, Am. Mus. 1882, plate 6, figs. 40, 41, 42. (*Camarotoria ? wortheni*, which see above. Also *Rhynchonella wortheni*, Hall. Trans. Alb. Acad. Vol. 4, 1856.) Collett's Indiana Report of 1882, plate 29, fig. 40, 41, 42. Spergen Hill. *Subcarb. limestone. XI.*



Rhynchonella medea, Billings. Geology of Canada, 1863, page 370, fig. 388 *a*, dorsal valve. In the *Corniferous limestone formation* of Upper Canada. *VIII a.*



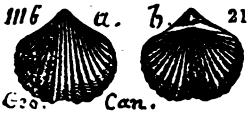
Rhynchonella medialis, Simpson. Trans. Amer. Phil. Soc. Philada., 1889, page 444, fig. 9, based on Sp. 9509; shell broaply oval or subtrigonal in outline; height a little less than the width; greatest width about two-thirds the length of the shell from the beak. Margins from the apex to the widest portion of the shell nearly straight, then abruptly rounding and slightly produced in front in a broad extension. Ventral valve convex at the sides, depressed in the middle; mesial sinus commencing at the apex and growing wider to the base, where it occupies fully one-half of the width of the valve. Dorsal valve unknown. Surface marked by about twenty plications, of which eleven occupy the mesial sinus and are smaller than those on the other portions of the valve, there being five in the same space occupied by three of the others; plications rounded or subangular. There are also very fine radiating striæ covering the plications, four or five in the space of 1 mm. The plications are crossed by lines or varices of growth. No concentric striæ have been observed, though they may occur on more perfectly preserved specimens. The specimen from which the above description was taken has a height of 25 mm., and a width of 30 mm. This species is associated with *Rhynchonella*, but may be readily distinguished by its size and the much larger num-


VIII-X ?
A.P.S.
Tr. 1889.

ber of plications in the mesial fold. The only species approaching it in that respect is *R.* (*S.*) *venustula*, of the Hamilton group, but they are so unlike in other respects that there will be no difficulty in distinguishing them. *Formation and locality.* Waverly group, near Warren, Pa. *X.*

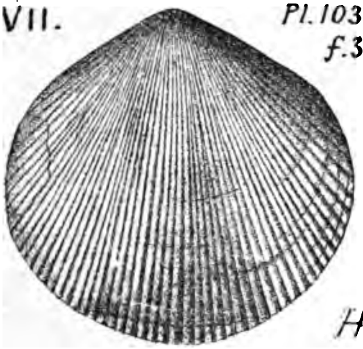
Rhynchonella missouriensis, wrong name given to Randall's Warren specimens 9,506, 9,507, 9,508, 9,509, corrected by G. B. Simpson to **Rhynchonella** (*Stenoschisma*) **medialis**, 9,509; and to **Rhynchonella striata**, 9,506, 9,507, 9,508. Carll's Report I4, p. 305). *VIII–IX.*

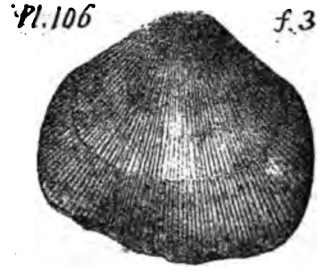
Rhynchonella ? modesta, Conrad. Geology of Canada, 1863, page 211, fig. 211, *a*, dorsal valve; *b*, ventral valve. *Hudson river* (*Loraine*) *formation. III b*



Rhynchonella (*Stenoschisma*) **multistriata**, Hall, 10th Regent's Rpt. N. Y., 1857; Pal. N. Y. Vol. 3, p. 440, plate 102, fig. 3, dorsal valve; plate 106, fig. 3, imperfect dorsal valve of a younger specimen; both from *Oriskany* outcrops in the Lower Helderburg mountains of New York. In Huntingdon Co., Orbisonia, (OOO, 208) Spec. 702–11. *Oriskany SS. VII.*

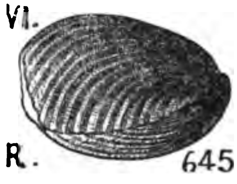
VII.



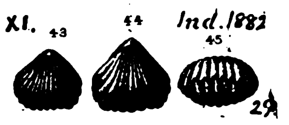


Hall. Pal. N. Y. Vol. III. 1861

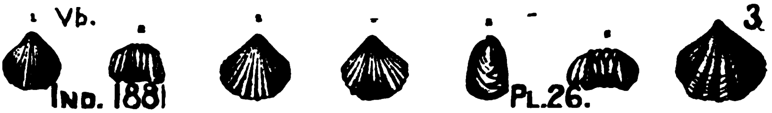
Rhynchonella mutabilis, Hall. 10th report, 1857; Pal. N. Y. Vol 3, plate 45, figs. 2 *f*, *g*. *R. nobilis* H. D. Rogers, Geol. Pa., 1858, p. 825 note, fig. 645. Found by Claypole in Perry Co., Pa.



(F2, preface) in *Lower Helderberg. VI.*



Rhynchonella mutata. (Hall. Trans. Alb. Inst. Vol. 4; Iowa Report, 1858, plate 23, fig. 3; Whitfield, Bull. 3, Am. Mus. N. H., 1882, plate 6, figs. 43 to 45). Collett, Indiana Rt., 1882, page 332, plate 29, fig. 43, medium size, back view; figs. 44, 45, large specimen, back and front views. Alton, Ill., Spergen Hill, etc., Ind. *Subcarb. XI.*


1 Vb.
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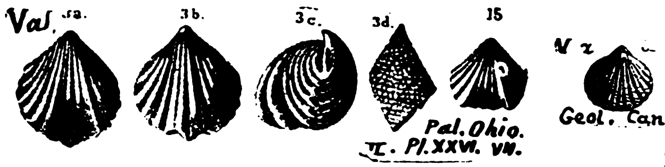
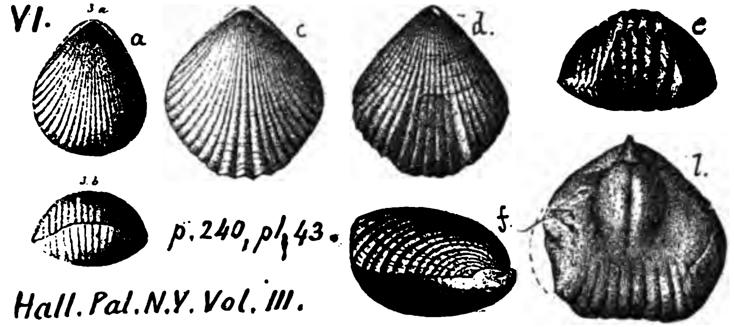
3



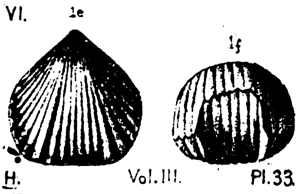
Rhynchonella (*Stenoschisma*) **neglecta,** Hall. (*Atrypa neglecta,* Hall, Pal. N. Y. Vol. 2, 1852, page 274, pl. 57, fig. 1 *a* to *p*, *Niagara*). Collett's Indiana Rt., 1881, page 305, plate 26, figs. 1 to 6; 27, fig. 3. Geol. Canada, 1863, page 315, fig. 325. *Clinton.* Pal. Ohio, Vol. 2, 1875, page 134, plate 7, fig. 15; plate 15, fig. 3 *a*, *b*, *c*, ventral, dorsal, lateral views of large gibbous specimen; 3 *d*, magnified granulated surface; plate 7, fig. 15, gutta percha cast of natural mold of ventral shell. (*Error on page 57 above.* **Atrypa neglecta** should be *Rhynchonella neglecta.* R. P. Whitfield, MS. Corr. Jan., 1889).—In Pennsylvania, Columbia Co., at the Bloomsburg *fossil ore* mine (G7, 113, 232). In Huntingdon Co., Barre forge, shale over *fossil ore* (Spec. 12,849). Orbisonia, limestone layers in shale over *fossil ore* (T3, 141; OOO, p. 201, Spec.; 508–17; McKeesville, over *fossil ore*, Spec. 502–45 *b;* 503–15; 505–9,–20,–27,–30). In Bedford Co., shale over Old Weaverling tunnel fossil ore, Dunning's narrows; also in *shale partings* in the ore bed at Wolfsburg. (T2, 144, 150.) In Perry Co., over the Millerstown fossil ore bed, Spec. 12,674 (OOO, 12,164, unnamed); 12,677, on the same slab with *Beyrichia lata;* 12,681 (improperly named *R. plicatella*, a misprint for *plicatula*)*;* 12,682 (unnamed); 12,683 (with a beauful *Avicula emacerata*, and *Sp. striata*. G. B. S. 1889). *Va.*

Rhynchonella neglecta, Var. **scobina,** Meek. Am. Jour. S. & A. [3] Vol. 4, 1872. *Clinton*, *Va.*

Rhynchonella nobilis, Hall. Pal. N. Y. Vol. 3, 1859, p. 240, plate 43. figs. 3 *a*, *b*, a young specimen with scarcely defined sinus; *c*, *d*, *e*, *f*, dorsal, ventral, front, and profile of an individual of medium size, others are larger; *b*, cast of ventral valve. Species always longer than *R. abrupta*, and shorter than *R. campbellana;* also more gibbous in old specimens, higher in front, and more finely folded than Barrande's Bohemian *Terebratula eucharis*. Found in the *Upper Pentamerus limestone* of the Lower Helderberg formation along the Mohawk.—In Pennsylvania reported found in the Aughwick Valley of Huntingdon. Geol. Pa., 1858. It has not been recognized by the Second Survey, in the *Lower Helderberg rocks*. *VI.*



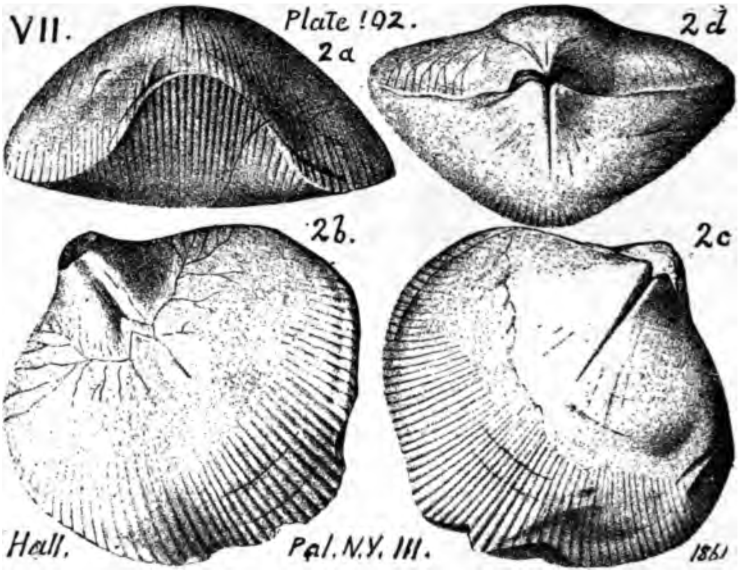
Rhynchonella nucleolata. (Hall, 10th An. Rt. Pal. N. Y. Vol. 3, page 227, plate 33, figs. 1 *e*, 1 *f* (copied). *Lower Helderberg*). In Pennsylvania, Perry Co., Clark's Mill, Spec. 11,798 (three, one fair, the other two small fragments of the interior); 12,913 (good); 12,958 (5 very good). *Lower Helderberg*, shaly limestone. *VI.*



Rhynchonella nucula (*Terebratula nucula*) Sowerby, 1839, Sil. System. *U. Sil. VI?*

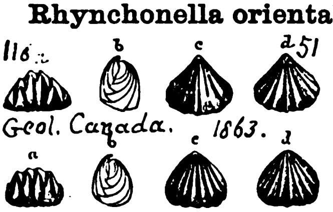
Rhynchonella nutrix, Billings. Cat. Sib. Foss. Anticosti, 1866, p. 43. *VI?*

Rhynchonella oblata, Hall. 10th Regts. Rt. 1857. Pal. N. Y. Vol. 3, 1859, 1861, p. 439, plate 102, fig. 2 *a*, cast, front view of young one, showing broad shallow sinus; *b*, another cast, ventral side, with muscular area, and ramifying vascular impressions (not very exactly drawn); *c*, *d*, dorsal and cardinal views of same; radiating striæ preserved on lower half of cast. *Oriskany sandstone*, Albany Co., N. Y.—In Pennsylvania, found by White, at Grove Bro's. tunnel, Montour Co. (G7, p. 86, 297). *VII.*



Rhynchonella orbicularis. See **Stenoschisma orbiculare.** *VIII g.*

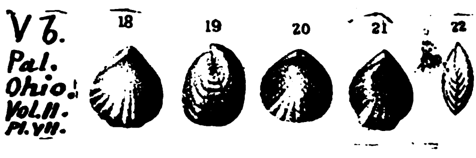
Rhynchonella orientalis, Billings. Canad. Nat. and Geol. Vol. 4, 1859. Geol. Canada, 1863, page 126, fig. 51, from different views of two specimens, from the *Chazy limestone formation. II b.*



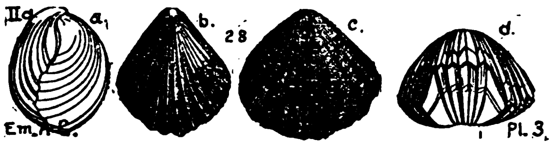
Rhynchonella osagensis. See **R. uta.** XIII.

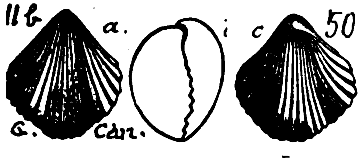
Rhynconella ottumwa, near **R. uta.** XIII.

Rhynchonella pisum (*pisa*), Hall & Whitfield, Pal. Ohio. Vol. 2, 1875, page 135, plate 7, fig. 18, 19, dorsal and profile views of a well formed ventricose specimen; 20, dorsal, shorter form, with depressed convex valves; 21, long, venticose form, unusually angular plications; 22, flat valved, young? specimen. Resembles *R. neglecta* in the same beds, but valves more convex and folds not so sharp. The more ventricose specimens resemble small *R. nucleolata*, but are longer, beak projects more, plications are never flattened and have not the groove. Highland Co., O. *Niagara*, *V b*.

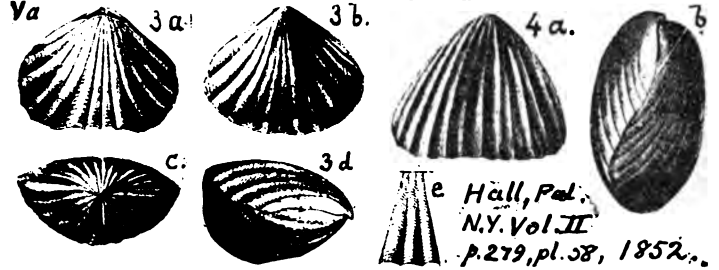


Rhynchonella plena. (*Atrypa plena*, Hall, Pal. N. Y. Vol. 1, *Chazy*). Emmons, A. G. I, ii, 191, pl. 3, f. 28, *a*, *b*, *c*, *d*, beaks small and close pressed together; 15 to 20, plain, undivided folds, four or five in the hollow. *Calciferous sandstone* (upper beds); common in *Chazy limestone*. Logan's Geology of Canada, 1863, page 126, fig. 50 *a* ventral, *c* dorsal valve. *II a*, *II b*.



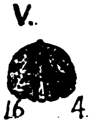


Rhynchonella plicatella (*Atrypa plicatella*. Hall. Pal. N. Y. Vol. 2, 1852, p. 279, pl. 58, figs. 3 *a–e;* 4 *a*, *b*. (*Terebratula* (*Anomites*) *plicatella*, Linnæ, etc. *T. lacunosa*, Schlotheim, of Sowerby, Murchison, but not of Dalman and Hi-

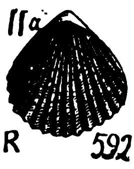

Va
3 a
3 b.
4 a.
b
c.
3 d
e
Hall, Pal. N.Y. Vol II p.279, pl.58, 1852.

singer.) *Niagara formation* of N. Y. *Va.* — In Perry Co., Pa., Millerstown ore works, Claypole's two specimens, 12,681 (OOO, p. 164) are *Rhynchonella neglecta.* (G. B. S). *V a.*

Rhynchonella plicatula. (*Atrypa plicatula*). Hall, page 71, fig. 16, 4. *Clinton formation. V a.* — In Pennsylvania, collected by Hall & Hale, 1875, at Matilda furnace, Mifflin Co., Spec. 503-9, from *Clinton shale*, over Fossil ore. *V a.*



Rhynchonella plicifera. (*Atrypa plicifera*). Hall. Pal. N. Y. Vol. 1, 1847, page 22, plate 4 *bis.* figs. 8 *a*, *b*, *c*, *d*. *Chazy.* Rogers' Geol. Pa., 1858, page 817, fig. 592. In *Chazy* (?) *limestone. II b.*

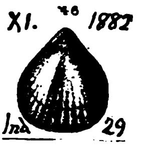


Rhynchonella prolifica. See **Stenoschisma prolificum.** *VIII c.* Claypole's 12,488 (OOO, p. 156) marked *R. horsfordi* is more probably this; 12,387-12,746, from Rough and Ready, Huntingdon Co. (misnamed *prolifera* in OOO, 168); 12,756, Sumner's, Hunt. Co. (unnamed in OOO, p. 173. G. B. S., 1889); from *Marcellus. VIII b.*

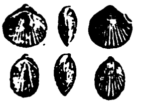
Rhynchonella psittacea, Linn. Geology of Canada, 1863, figure 473, from the *Champlain clay*, or *Glacial deposit*, Post-tertiary, *PP.*

Rhynchonella pugnus. Martin. Petrifact. Derbyshire. *Lower Carboniferous.* Claypole's specimen 108-7 (OOO, 12,-470) obtained from Prof. H. S. Williams of Ithaca N. Y., from *Chemung strata*, is marked *contracta ?*, as if it were doubted that an English *Subcarboniferous* species *could* exist in American *Chemung strata. VIII g.*

Rhynchonella quadricostata (*Atrypa* ——; *Orthis* ——.) Hall, Geol. N. Y., 1843, page 223, fig. 95, 2. Vanuxem Geol. N. Y., 1842, page 168, fig. 42, 2. *Genessee formation. VIII e.*

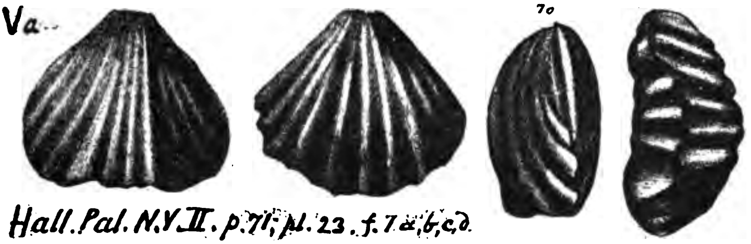


Rhynchonella recinula. (Hall, Trans. Albany Inst. Vol. 4, 1856, p. 9; Whitfield, Bulletin 3, American Mus. Nat. Hist. N. Y., 1882, plate 6, fig. 46). Collett's Indiana Report of 1882, p. 330, plate 29, fig. 46, *enlarged six times*, back view of type specimen; possibly a young *Rhyn.* (*Atrypa*) *nana?* Spergen Hill, etc. *Subcarboniferous. XI.*



Rhynchonella recurvirostra, Hall. (*Atrypa recurvirostra*). Pal. N. Y. Vol. 1, 1847, *Black river* and *Hudson river*. Geol. Canada, 1863, page 168, fig. 152. *Trenton and Hudson river formation. II c. III b.*

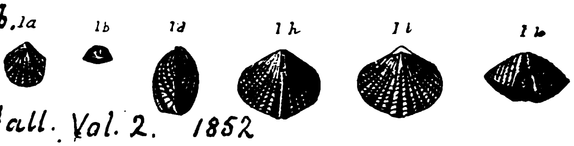
Rhynchonella robusta (*Atrypa robusta*, Hall. Pal. N.



Hall. Pal. N.Y. II. p. 71; pl. 23. f. 7 a, b, c, d.

Y. Vol. 2, 1852, p. 71, pl. 23, fig. 7 *a*, *b*, *c*, *d*. Dorsal and ventral valves, profile and front views of a full grown specimen, showing 3 plications in the mesial sinus and 4 on the elevations; specimen somewhat flattened from the rounder perfect shape; species easily known by its few strong folds, undivided from the beak. From the upper limestone of the *Clinton* at Lockport, N. Y.) — In Pennsylvania found by White in the Montour ridge *fossil ore bed* and in the *Clinton upper olive shale.* (G7, pp. 113, 232, 252, 341); and by C. E. Hall in the Furguson Valley *Clinton ore* of Huntingdon Co. (Proc. A. P. S., Jan. 5, 1876.) *V a.*

Rhynchonella rugosa. Hall. (*Atrypa rugosa*) Pal. N.



Hall. Vol. 2. 1852

Y. Vol. 2, 1851, *Niagara*. Geol. Canada, 1863, page 315, fig 321. *Clinton formation. V a, b.*

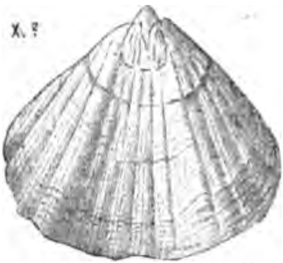
Rhynchonella sagerana, Winchell, Proc. Acad. Nat. Sci. 1862. *Marshall group* of Michigan. *X.*

Rhynchonella sappho. See **Stenoschisma sappho.** Claypole's specimen (unnamed) 12,335 (OOO, p. 151), is doubtfully assigned to this species by G. B. Simpson (1889). Collected by I. C. White near Bloomsburg, Columbia Co., Pa., from "*Catskill*" strata in Rupert's Narrows. *IX.*

Rhynchonella sordida. (*Atrypa sordida*, Hall, Pal. N. Y. Vol. 1, 1847, *Trenton.*) Emmons, Amer. Geol. I, ii, 1855, 192, plate 10, fig. 16; small, circular, convex; undivided ribs roughened by cross lines; no middle fold. Supposed to be a young shell. Emmons. *Trenton formation. II c.*

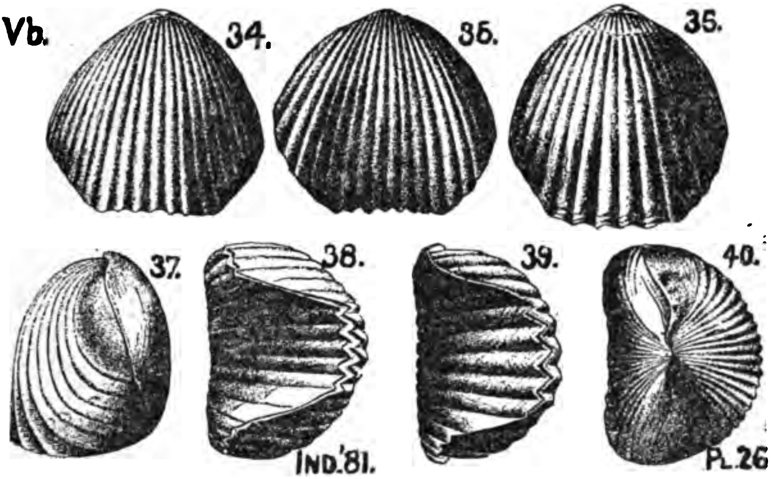
Rhyn. stephani. See **Stenoschisma stephani.** *VIII g.*

Rhynchonella striata, *new species*, Simpson, Trans. Amer. Phil. Soc. Philada., 1889, page 444, fig. 10, based on specimens 9506, 9507, 9508, of Randall's collections at Warren, wrongly labelled *R. missouriensis.* Only the ventral valves of this species have been observed, but they differ so much from known forms that it is necessary to consider them as belonging to a new species. Shell subtriangular ovate, apex pointed; length and width about equal. Margins from the apex to below the middle nearly straight, broadly rounded below, and at the base produced in a broad extension. Ventral valve convex at the sides, depressed at the middle. Mesial sinus beginning near the apex and continuing to the base, becoming very broad as it approaches the front. Surface marked by thirteen plications, of which five occupy the mesial sinus, the three central ones being larger than the outer ones, but all smaller than those on the other portions of the shell; plications subangular or angular. There are also very fine radiating striæ on the plications, three in the space of 1 mm. The plications are crossed by fine concentric striæ, which are most prominent on the front of the valve, becoming obsolete above, and also by stronger imbricating lines or varices of growth. The specimens observed have

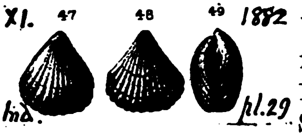


a height of about 35 mm.; width just below the middle equal to the height, This species may be distinguished from any other of this formation by its large size, deep sinus and radiating striations. This species closely resembles *Rhynchonella missouriensis* of the Kinderhook group, but the shell is larger, the apex more pointed, giving an angular appearance to the upper portion of the shell, and the greatest width is below the middle. Four miles southwest of Warren, Warren county, Pa. *Waverly group. X.*

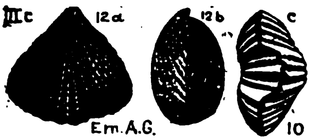
Rhynchonella stricklandi, Hall. Fig. from Collett's Indiana Report of 1881, p. 308, plate 26, figs 34–40. — In Pennsylvania, Mifflin Co., McKeesville. Spec. 501–14 (two specs. of a large form, with strong plications, resembling closely the *typical Niagara form*), collected by Hale and Hall, from the shales overlying the *Clinton fossil ore bed.* Spec. 504–14 (OOO, p. 197) Orbisonia *fossil ore.* Spec. 505–1, –14–16, –32 (perhaps a *new species*), 505–33 (fragment), –38, –39, McKee's fossil ore bank, shale over ore bed. Spec. 507–4, Matilda furnance, *Clinton lime shale. V a.*



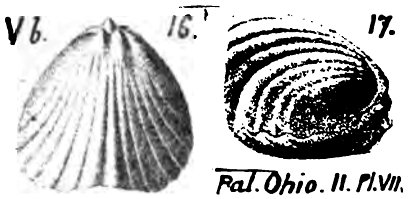
Rhynchonella subcuneata. (Hall. Trans. Alb. Inst. Vol. 4, 1856; Iowa Rt. 1858, plate 23; Whitfield, Bull. 3, A. M N. H. pl. 6, figs. 47 to 49.) Collett's Indiana Rt., 182, p. 333, pl. 29, figs. 47, 48, 49. Spurgen Hill, *Subcarb. XI.*



Rhynchonella subtrigonalis. (*Atrypa subtrigonalis*, Hall, Pal. N. Y. Vol. 1, 1847, *Trenton*). Emmons, A. S. I, ii, page 190, plate 10, fig. 12, *a*, *b*, *c ;* tapers to a small beak; about 20 folds, 3 in the middle channel. *Trenton. II c.*



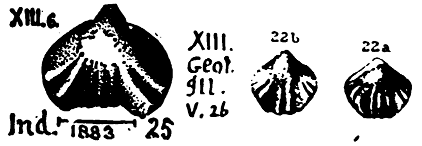
Rhynchonella tennesseensis, Rœmer, Sil. Fauna, W. Tenn., 1860, Pal. Ohio, Vol. 2, 1875. page 136, plate 7, figs. 16, 17, dorsal and ventral views of internal cast from Yellow Springs, O.; shorter than it was before the thick shell at the beak was dissolved away. Species easily known by its broad, subtriangular shape, and coarsely plicated surface, with broad sinus and ridge, especially when looked at in front. *Niagara. V b.*


Vb.
16.
17.
Pal. Ohio. II. Pl. VII.

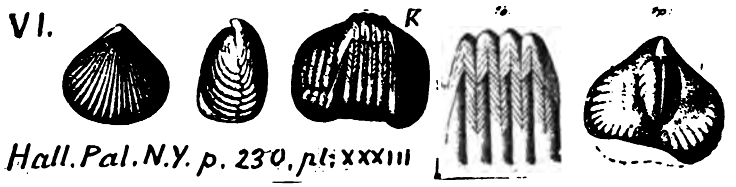
Rhyn. thalia. See **Stenoschisma billingsii**. *VIII a.*

Rhyn. tethys. See **Stenoschisma tethys.** *VIII a.*

Rhynchonella uta. (*Terebratula uta*, Marcon, Geology of N. America, Coal Measures.) *Rhynchonella osagensis*, Swallow, Transact. St. Louis Acad. Sci. Vol. 1, 1858. Geol. Illinois, Vol. 5 plate 25, figs. 22 *a*, *b*.) Collett's Indiana Rt., 1882, page 132. plate 25, fig. 6, *enlarged*, ventral view, closely related to the L. Carboniferous *Rhynchonella ottumwa*, and ranging from Indiana to N. Mexico; throughout *U. Coal Measures. XV?*

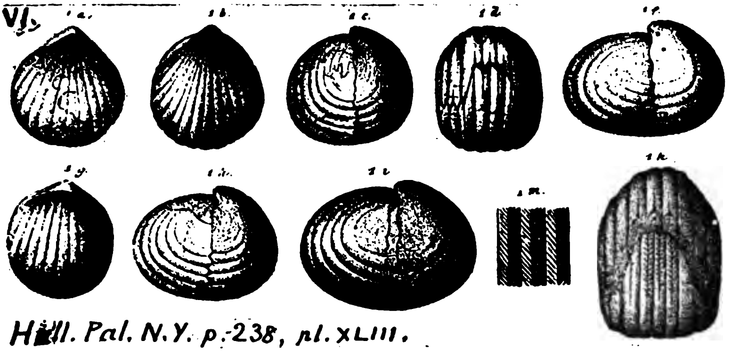


Rhynchonella vellicata, Hall. Pal. N. Y. Vol. 3, 1859, page 230, plate 33, selected figs. 1 *a*, *b*, dorsal valve and profile of a characteristic specimen; *K*, a more gibbous form which may be a variety of *R. abrupta ;* *o*, *enlargement* of plications


VI.
K
o
p
Hall. Pal. N.Y. p. 230, pl. XXXIII

in front; *p*, cast of a ventral valve, with the lobed muscular impression plainly shown. Found in the shaly limestone of the *Lower Helderberg.*—In Perry Co. Pa. Claypole collected it from various places along the outcrops of the *chert beds* under the *Oriskany;* for example, Spec. 11,830 (11–6, about two-thirds remain to show conclusively the species. G. B. S.) *VI.*

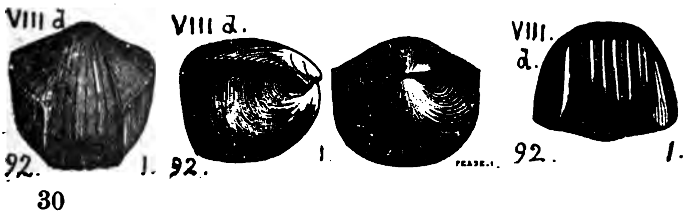
Rhynchonella ventricosa, Hall, Pal. N. Y. Vol. 3, 1859,



Hall. Pal. N.Y. p. 238, pl. XLIII.

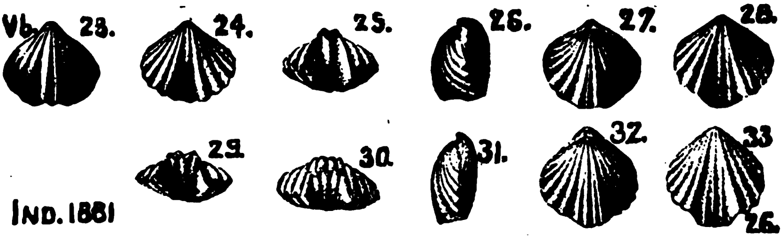
page 238, plate 43, figs. 1 *a*, *b*, *c*, *d*, back, belly, side, front of specimen of ordinary size and proportion; *e*, *f*, *g*, *h*, of a more pot-bellied (ventricose) specimen; *i*, *k*, of an extreme case; *l*, one longer than usual; *m*, *enlarged*, plications showing impressed lines and strong striæ in the front of the shell. Belongs to the type of *R. wilsoni* and is one of the forms often referred to that species. In some of its variations it resembles *R. pyramidata;* and sometimes still more *R. nucleolata*, but with stronger plications. Apparently restricted in the Mohawk valley to one single bed in the upper part of the *Lower Helderberg formation.*—In Pennsylvania, has been found on the Delaware river (G6, p. 134); on the N. Branch Susquehanna in the *Bastard limestone* (G7, 101); in Bedford Co., near New Paris, Napier, on the weathered surface of *cherty limestone* in the upper part of the formation. (T2, pp. 88, 121.) *VI.*

Rhynchonella venustula, Hall, Pal. N. Y. Vol. 4, page



346, plate 55; *Atrypa cuboides*, Hall, Geol. W. Dist. N. Y., 1843, page 215, figs. 92, 1; 95, 5. Vanuxem Geol. 3d Dist. N. Y., 1842, page 163, fig. 41, 1, who identified it with Sowerby's *A. cuboides*, Geol. Trans. [2] LVI, fig. 24; Phillips, Pal. Foss. page 85, plate 34, fig. 150; *Terebratula crenulata*, Phillips, fig. 152; *Atrypa subcuboides*, D'Orbigny, Prodrom. Vol. 1, page 93, n. 884. Hall made the change of genus on account of certain differences between the European and American species. H. S. Williams who has studied this shell from New York, England, Belgium, France, Germany, Russia, Siberia, Persia and China, says that it has not been recognized in the interior of N. America, Meek's *R. castenea* from Nevada and McKenzie's river being only an ally of it; and that if a *Cuboides zone* be adopted for its world-area "it may be said that a considerable number of species (including forms, under different names, which are very closely allied modifications of the same races) appeared before the 'Cuboides Stage' in the English, European and Russian sections, but not till after that stage in the New York section." (Amer. Jour. Sci. Jan., 1890. On the Devonian System of Devonshire, page 36.) *Tully limestone. VIII d.*

Rhynchonella whitii, Winchell. Proc. Acad. Nat. Sci. 1862, *Marshall group*. Figs. from Collett's Indiana Rt. of 1881, page 307, plate 26, figs. 23–33.—*X*.



Rhynchonella wilsoni (*Terebratula wilsoni*, Sowerby, Min. Conch. Vol. 2), near the American species *R. grosvenori* of the *Warsaw limestone group*. *XI*.

Rhynchonella wortheni, Hall. See **Camaroforia? wortheni**. *XI*.

Rhynchonella ——? Figure on page 56 of this Dictionary wrongly placed under *Atrypa* (now *Whitfieldia*) *intermedia*. (R. P. Whitfield, 1889.)

Rhynchonella —— ? Figure on page 62 of this Dictionary is not an *Atrypa*. (Hall's 1843, fig. 81, 4.) (R. P. W.)

Rhynchonellas, in black *Trenton limestone* are the principal forms, in Nearhoff's quarry, N. side of the Little Juniata river above Tyrone forge; and also in the river bluff 560 feet west of the forge (bed No. 11 of C. E. Hall's river section) where Spec. 2583 was got. (T, 58. 59; T3, 365; O, 113.)—*II c.*

Rhynchonellas, etc., etc., are numerous, but in a fragmentary condition, over the *Ore sandstone*, at Barre station, Huntingdon Co. (T3, 222); and in Bedford Co., over the County Farm *ore bed* (T2, 140); and *well preserved* in the fossil ore bed itself at Joe Walter's mine (T2, 153). May be *R. lævis*, Simpson, which Jas. Hall recognized as new species in spec. 506–9, got 2 miles S. W. of Bell's Mills, Bell's Mills, Blair Co., in *Clinton lime shales*. See also Spec. 502–43 from the shales over McKey's ore bed, Mifflin Co. *V a.*

Rhynchonellas, *Trematosperas*, and *Spiriferas* are numerous in the *Lower Helderberg* limestone at the Bedford cemtary (T2, 155.) *VI.*

Rhynchonellas in the *Oriskany*, are abundant, and described under their respective names in preceding pages. *VII.*

Rhynchonellas (*? Leptocœlias*) occur in *lower Corniferous beds*, on slope of the Hogback, Walpack bend, Pike Co. (See spec. 810–5.) *VIII a.*

Rhynchonellas in the *Marcellus* at E. C. Summer's, Huntingdon Co. (Spec. 12,858). *VIII b.*

Rhynchonellas in *Hamilton lower sandstone*, Huntingdon Co., on Weaver's run (T3, 156); specially abundant on Coffee run (T3, 112); on Shy Beaver creek, 700′ above *Oriskany* (T3, 163); and in Bedford Co., Saxton section (bed No. 41, 1800′ beneath *Chemung lower conglomerate*, (T2, 231.) *VIII c.*

Rhynchonellas in *Portage formation*, obscure specimens on Yellow creek, Bedford Co., 1500′ beneath *Chemung lower conglomerate* (T2, 80); and in Fulton Co., on Tonoloway creek, Thompson township, road to Brewer's mill where good collections of them can be made. (T2, 276.) *VIII f.*

Rhynchonellas in the *Chemung formation* are incredibly numerous in Middle and Northern Pennsylvania. In Bedford Co. none appear near the *Lower* (*Allegrippus*) *conglomerate*, but a layer 100 feet beneath contains them, with other brachipod shells. (T2, 79, 230.) In Huntingdon Co., on Coffee run, White reports that one single specimen of a *Rhynchonella* was the only form that could be distinctly made out of the many fragments of shells in the *Chemung upper* (*Lackawaxen*) *conglomerate*. (T3, 93.) This may be the *Third Oil Sand* of the Northwest, the *Panama conglomerate* of New York, and the *Leboeuf conglomerate* of Erie Co., in which Carll reports an abundance of *Rhynchonellas* (III, 70), especially at Carrott's quarry (III, 67); and also in the overlying shales (III, 71). *R. sappho* is found under the *Panama conglomerate* in N. Y., and *Rhynchonellas* are found 200 feet beneath it in Erie Co. (bed 15, Falls run section, Q4, 250.) In Perry Co., in the *King's mill sandstone* Claypole's spec. 11,991, 12,695 were found. In Tioga and Bradford Cos., the *upper Chemung* has many. (See Spec. 2232.) In McKean Co., *R. duplicata* (Spec. 881–2,–3). *VIII g.*

Rhynchonellas in the *Oil Sand group*, which may correspond to the *Passage beds* (*VIII–IX*) of middle and eastern Pennsylvania, are numerous. See Carll's specimens 3393, 3401, 3403, from McKean Co. In Huntingdon Co., with *Spiriferas*, Patterson section (bed No. 5, red sandstone, 500 feet above *Chemung upper conglomerate* (T3, 183), and in the *iron ore bed* of Clear ridge and Smith's valley, 250 feet ditto (T3, 102). In Lycoming Co., Logan station, Hay's *iron ore* (Spec. 893–2,–4, fragments) and Sellard's *iron ore* (Spec. 901–2,–3). Compare *R. eximia*, Spec. 884–1,–2,–6; and from Bradford Co., Spec. 886–5. To this horizon probably belong the *Rhynchonellas* occasionally seen by Stevenson in the fucoidal beds 1, and 3, of his Youghiogheny river section (K3, 104). In the *First Oil sand* at the top of the group, called in Warren Co. the *Hosmer run conglomerate*, well preserved specimens can be found (III, 250). *IX.*

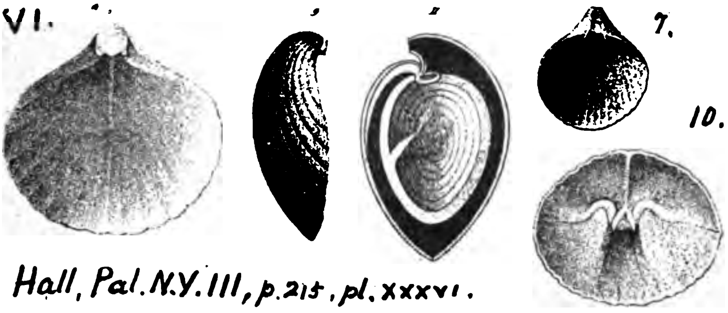
Rhynchonellas and *Aviculopectens* occur together in the *Bedford shale* (*Catskill*) *formation*, overlying the *Oil Sand group*. (Spec. 3318, 3320). Nelson farm, Venango Co. *IX.*

Rhynchonellas are exceptionally abundant in the *Pocono* formation, about its middle, in the bottom 30 feet of the *Shoup's run black shales* Broad Top, Huntingdon Co., 800′ to 830′ beneath the red shale (T3, 175, 299) and at Riddlesburg, Bedford Co., 610′ to 660′ beneath the red shale (T3, 81). [These shales correspond to the Sideling Hill tunnel coal measures, the Tipton coal measure, the Duncannon coal, and the coal measures of Tom's run in S. Virginia.] The top of the Pocono in the oil regions is the *Sub-olean* (*Garland*, *Sharon*) *conglomerate* and *Rhynchonellas* are numerous in the next underlying sub-divisions F, G, H, of Randall's section at Warren (III, 305); in McKean Co., on Wilcox hill (Spec. 3283); in Venango Co. Rooker farm (Spec. 2920); in Mercer and Crawford Cos., in the *Sharpsville upper sandstone*, poorly preserved (Q3, 62; Q4, 86, 148), and in the *Meadville upper limestone* over it, abundant in many places, mostly undescribed species, mainly of Kinderhook types (Q4, 83, 126.) These are the *Rhynchonellas* (Spec. 1000–18,–22) in White's collection from the Brookfield Coal Co.'s tunnel, Trumbull Co., O., near the State line. *X.*

Rhynchonellas occur at the bottom of the *Mauch Chunk red shale formation*, in the middle layers of the *Trough creek limestone*, Huntingdon Co. (T3, 77.) *XI.*

Rhynchonellas and *Lingulas* in the *Pottsville conglomerate* in Venango Co, on the McCaslin farm. Casts in sandstone over the *Second Mountain sand.* (Spec. 3148.) In Franklin Co., Bull's quarry, with *Orthis*, etc. (Spec. 3178.) In Crawford Co., Snodgrass' and Millers' quarries (Spec. 3178, 3201.) At Warren, one species of *Rhynchonella* was the solitary shell found in all Randall's sub divisions A, B, C, D, E (IIII, 305.) —From local drift Specs. 3048, 3409, 3410, 3412, 3413, were got. *XII.*

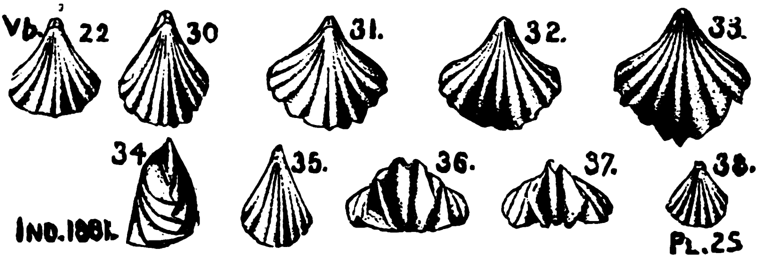
Rhynchospira formosa. (*Waldheimia formosa*, Hall, VI.



Hall, Pal. N.Y. III, p.215, pl. XXXVI.

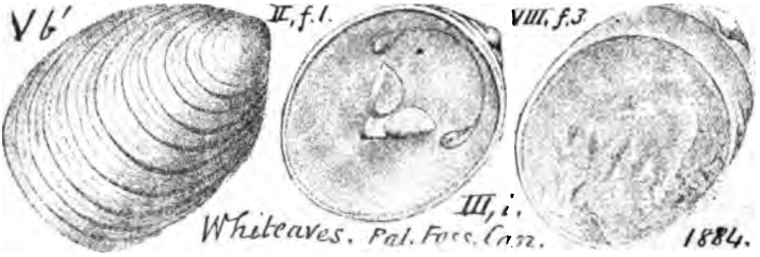
9th Regents' Report, N. Y., 1856). *Trematospira formosa.* Pal. N. Y. Vol. 3, 1859, page 215, plate 36, figs 2 *a* to *t ; Rhynchospira formosa*, page 485, plate 95 A, fig. 7, ventral inside; 8 *enlarged twice*, dorsal inside, showing broad cardinal process which curves the extremities ot the beak and, when the valves are closed, passes beneath the deltideal area of the cardinal process; also the short median septum; 9 profile; 10, upper part of two valves joined as in nature; 11, section showing internal anatomy. The articulation of *Rhynchospira* is much like that of *Nudeospira ;* the form like *Rhynchonella*. or rather *Waldheimia ;* some are like *Retria*, but the dorsal valve never has a straight hinge line, nor the ventral the same area, common to the species of that Carboniferous genus (Hall). *Lower Helderberg.* Abundant in Aughwick valley, Hunt. Co., Pa., at Orbisonia, etc., over the *Waterlime beds*, in the lowest 50′ of the *Lower Helderberg limestones.* (T, 41; T3, 126; Proc. P. P. S. Jan. 5, 1876). *VI.*

Rhynchotreta cuneata (Dalman) *Var. americana* (Hall),



.Collett's Ind. 1881, p. 310, pl. 25, figs. 29–38. *Niag. V b.*

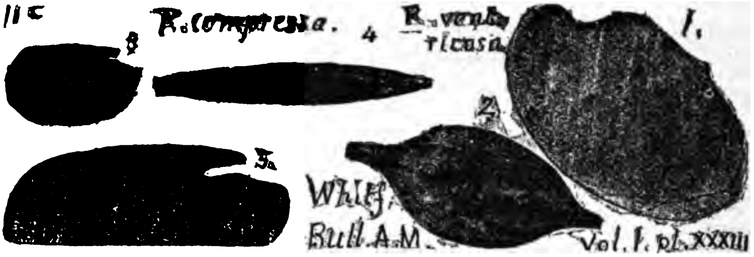
Rhynobolus galtensis, Hall, 1871. Whiteaves, Geol. Sur.


Vb′
II, f. 1.
VIII, f. 3
III, i.
Whiteaves, Pal. Foss. Can. 1884.

Canada, Pal. Foss. 1884, III, i, page 7, plate 2, fig. 1 a, exterior of pedicle (ventral) valve; plate 8, fig. 3, interior of brachial (dorsal) valve; 3 *a*, ventral, showing hinge. Has been placed in five different genera *Obolus galtensis*, Bill. *Obellina gal-*

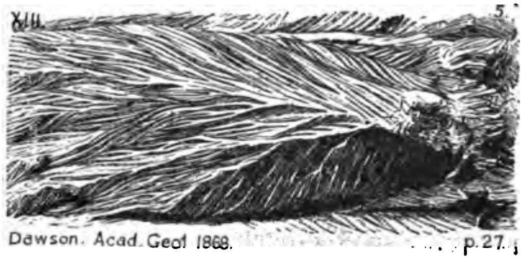
tensis, Bill, *Trimerella minor*, Dall. *T. galtensis*, Dav. & King. *Dinobolus galtensis*, D. and K. More closely allied to *Monomerella*, than to *Trimerella*. (See Q. J. S. Lond. XXX.) Durham, Canada West. in *Galt formation*. *V b'*.

Ribeiria compressa, Whitfield, Bull. Amer. Mus. Nat. Hist. N. Y. Vol. 1, No. 8, 1886, page 344, plate 33, fig. 3, *natural size*, side view of a cast of this (*Ceratiocaris*) *Phyllocaris*; 4, 5, *enlarged* back and side diagramic views of it. There is no evidence of bivalve character; no trace of a hinge, as in *Leperditia*, etc.); the shell seems to be merely bent over along the line of the back, as a continuous piece, enclosing both sides of the animal's body, and the muscular scars are situated exactly on this middle line. Compare *R. longiuscula*, Billings. Fort Cassin, Vt. *Calciferous SS. Div. D. II a.*



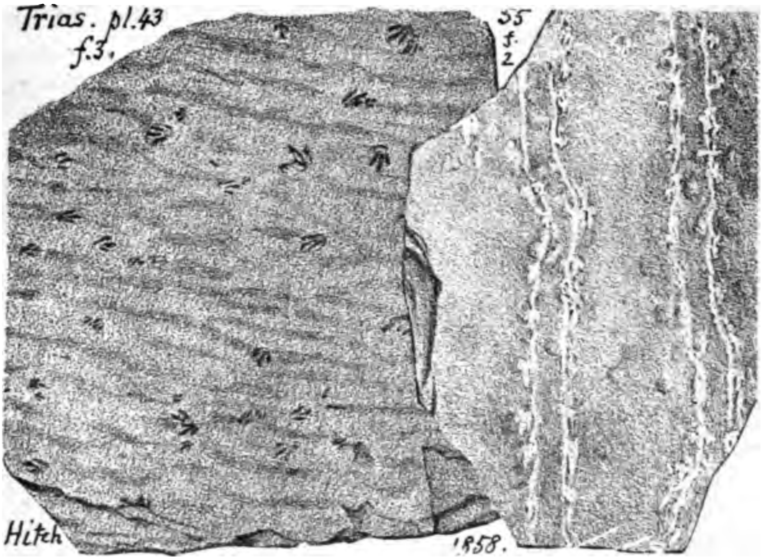
Ribeiria ventricosa, Whitfield; same reference, figs. 1, 2 (with *R. compressa* above) *enlarged twice*, side and back views of a cast, showing muscular markings; looks like a small *Nucula*, but there is no evidence of a hinge; somewhat like *R. calcifera*, Bill. Pal. Foss. Vol 1, figs. 326, *a*, *b*, *c*, but more gibbous and more prominent beaks. Note that what remains of the substance of the carapace (shell) is crystalline, and not homogeneous as usual in crustacean fossils. Fort Cassin, Vt., *Calciferous. II a. D.* (Brainard and Seely.)

Rill marks (cast) made by the retreating wave water on muddy shore in the coal age, fossilized on a slab of Carboniferous mud sandstone, Nova Scotia. Dawson's Acadian Geol., 1868, page 27, fig. 5, *reduced in size*.


XIII.
5
Dawson. Acad. Geol 1868.
p. 27.

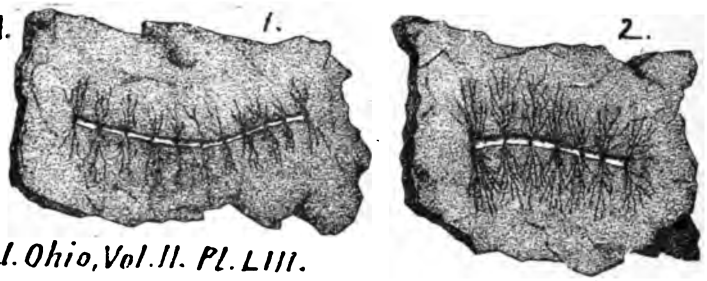
Rinodus. See **Ptychodus calceolus.** *VIII c.*

Ripple marks made by the waves in shallow water are abundant in all sandy formations:—*Medina*, *IV.* Beautiful specimens on the bare surfaces of many strata in the railroad cut at Cook's mills, Wills' creek, Bedford Co. (T2, 98); see spec. 5011 (OO, 29) on white sandstone from Rockhill gap, Huntingdon Co. — *Clinton*, *Va.* Ripple marks and broken shells prove the littoral or estuary deposit of the shales (T3, 143.)—*Hamilton lower sandstones*, *VIII c*, in Huntingdon Co. are abundantly covered with them (T, 32).—*Hamilton upper sandstones*, *VIII c*, the lower layers on Aughwick creek show them finely (T, 111).—*Chemung red clay-sandstone*, *VIII g*, at Imler's cross-roads, Kings township, Bedford Co., have seaweeds with ripple marks, evidently on a quiet shore (T2. 133). —*Chemung-Catskill passage beds*, *VIII–IX*, red shale and sandstone in Smith's valley, Clear ridge, Huntingdon Co. (T3, 102); see spec. 5012 (OO, 29) on the upper side which are ripple marks, and on the under side are seaweeds, *Spirifera disjuncta* shells.—*Catskill*, *IX.* The whole formation, 2500 feet thick, especially the red shale layers, have their surfaces plentifully ripple-marked (T3, 92); and in Bedford Co. hand-



some examples are seen in the soft red sandstones of the Hyndman section (T2, 74, 103). Five specimens are in the special collection (OOO, p. 251, marked 903–1, with seaweed impression on the wave marks), from Auburn Centre, Susquehanna Co., one mile south of the village, from the bottom beds of the great formation.—*Pocono sandstone* and coarse shale, *X*. See specimens from Venango Co., marked (O, 128), 2887, 2888, 2917, 2919, 2952; from Crawford Co., 3249; from Warren Co., 3341; from McKean Co., 3639.—In *New Red soft sandstone* they are very abundant. See Hitchcock's Ichnology of N. Eng., page 168, plate 43, fig. 3 (4, 5, omitted), reduced from a slab in the Amherst Museum, 31 in. long by 25 in. wide, with ripples and bird tracks; plate 55, fig. 2, reduced from another slab 9″ by 6″ with mud gas bubbles.

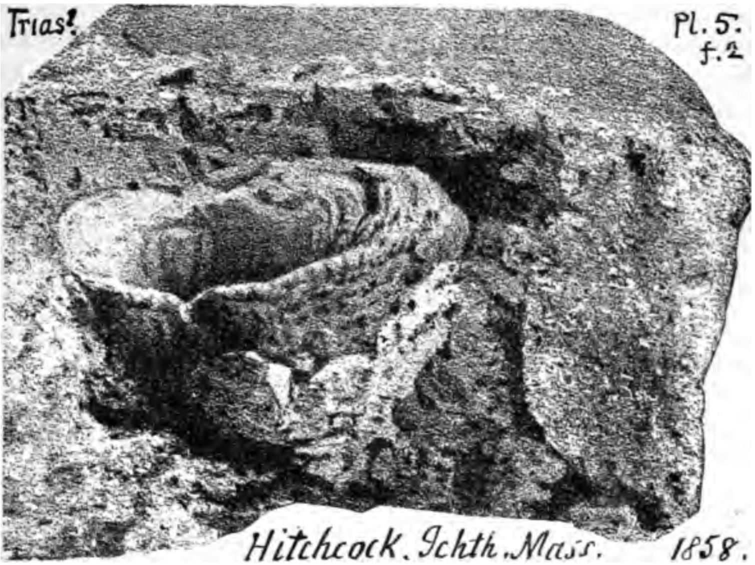
Roots of coal plants ? Andrews, in Pal. Ohio, Vol. 2, 1875, page 424, plate 53, figs. 1, 2, *natural size ;* probably portions of *Asterophyllites*, submerged, its leaves taking the form of rootlets; found in shale near the *base* of the *coal measures* in Perry Co., Ohio; the only other *Asterophyllites* found in this shale being *erectifolius*, and *minutus* , if they be the latter, there is a wonderful thickening of stem, and multiplication of leaves. Compare Lind. & Hutton's submerged (?) *A. longifolia*. Foss. Flor. G. B. Vol. 1, pl. 18. *XII*.



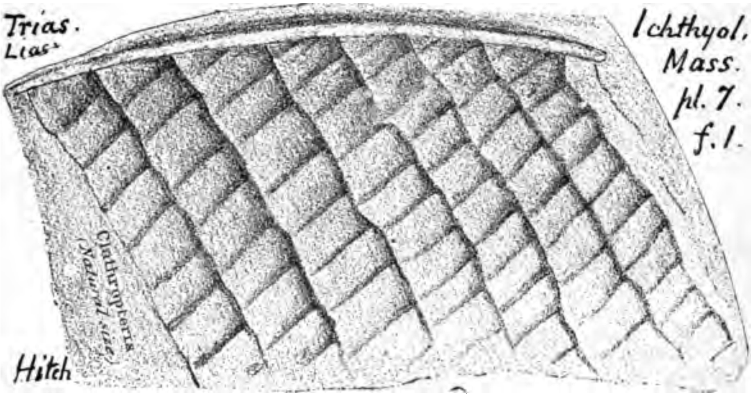
Pal. Ohio, Vol. II. Pl. LIII.

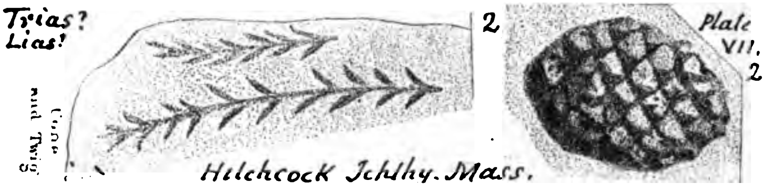
Rotophycus. A radiating fucoid covering the under surface of a plate of calcareous iron ore over *Brookville* (*Clarion?*) *coal* bed, at the toll bridge, Beaver Falls, Beaver Co., Pa. Q, p. 250. *XIII*.

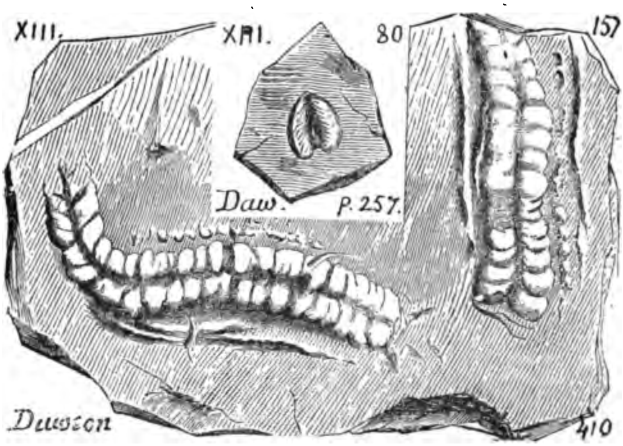
Rotalia. See **Endothyra baileyi.** *XI*.



Rudistæ in Connecticut river sandstone. Hitchcock's Ichn. N. E. 1858, page 6, plate 5, fig. 2, of *the only shell found* (up to 1858) in the *New Red sandstone* of the Connecticut river valley, which corresponds to the "brown sandstone" and red shale formation which runs in a broad belt across Pennsylvania through Bucks, Montgomery, Chester, Berks, Lancaster, York and Adams counties, and is commonly identified with the *Triassic formation* of Europe, although its bottom division has been suspected to be as old as the *Permian*, and its uppermost beds to be *Lias* or *Oolite*. The great scarcity of shells in it is remarkable. Several outcrops (perhaps repetitions of one outcrop) of *Estheria*-bearing shale have been traced across New Jersey into Pennsylvania; but almost the only fossils are footprints of animals and insects. The specimen figured by Dr. Hitchcock (preserved not petrified) is allied to Lamarck's *Rudistæ* (a *Sphærulite*, or a *Hippurite*), supposed to be confined in Europe to the *Chalk*. In Virginia the plants (*Zamites*, etc.) and four species of shells (*Posidonomya*, and *Cypris*) suggest a *Jurassic* or lower *Oolitic* age. (W. B. Rogers.) At Mt. Tom, Mass. *Clathopteris rectiusculus* was found in the middle of the sandstone mass, a European fern peculiar to the top of the *Trias* and bottom of the *Lias;* so that the upper half may be considered of later age than *Triassic.* (Hitchcock, Ichn. N. E. 1858, page 6, plate 5, fig. 1, and plate 7, fig. 1 (the last of which I insert here.) A twig and cone from Field's quarry Mass., in the Amherst museum, closely resembles Lyell's fig. 244, in his Manual of Geology, 4th edition, of one from the European *Wealden* formation at the bottom of the *Cretaceous.* (See Hitchcock's plate 7, fig. 2, here given).



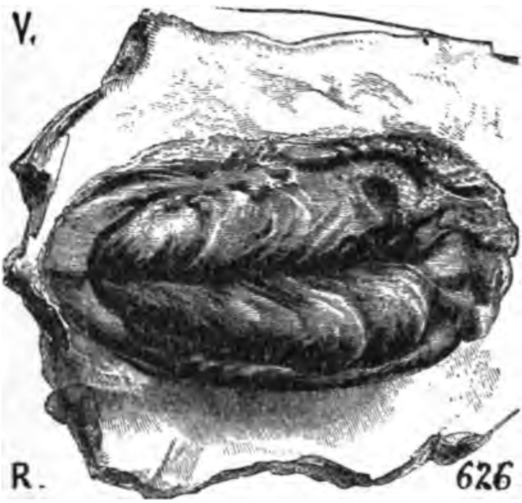




Rusichnites carbonarius, Dawson. Acad Geol. 1868, page 257, fig. 80; supposed burrows of *trilobites* or other crustaceans of the Coal age, in Nova Scotia. *XIII.*

Rusichnites acadicus, Dawson, Acad. Geol. 1868, page 410, page 157, casts of continuous rounded furrows, about ⅛ in. broad, crossed by waves and lines; and on each side of each, 1-10 in. distant, parallel interrupted lines, casts in relief; exactly like the tracks now made by the swimming feet and shell edges of any small King crab (*limulus*), and curving to and fro like these; undoubtedly made by similar small crustaceans of the Coal age. Dawson. *See last figure. XIII.—Note.* No instance of *Rusichnites* showing a definite termination is reported; but Walcott has recently received for the Nat. Mus. Wash. D. C. a slab on which a track stops behind a fossil *mollusk* as large as a man's hand.

Rusophycus bilobatus (*Fucoides bilobatus*) Rogers, page 822, fig. 626. Hall, page 77, fig. 19, 1. Vanuxem, page 79, fig. 11, 1. *Clinton* formation, *V a.* (Also in the Cincinnati rocks, Loraine, or *Hudson formation. III b.* S. A. Miller; Am. Pal. Foss., 1877). For varieties: *clavatus*, see Hall Pal. N. Y. Vol. 2, *V a*;—*pudicus*, same, III b; *V a. Subangulatus*, same, *V a.*—*grenvilliensis*, see Billings, Pal. Foss. Vol. 1, 1862. *Chazy. II b.*



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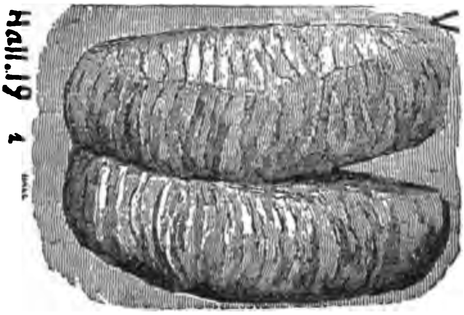
Hall.19 1

Additions, Corrections, Synonyms, Etc., continued from Vol. I.

357, line 4, read *Acrostichites*, — Line 8 for Va. read N. C. and for *Trias* read *Rhætic* (W. M. Fontaine).—Line 9, for Triassic, read Mesozoic.—Line next to bottom read *rœhlii*.—Bottom line, *Acrostichites*.

358, line 2. For *Trias* read *Rhætic*. (W. M. F.)

359, line 8. *L. proliferum* does not occur in *XV* in Pennsylvania. (J. J. Stevenson.)

362, line 15. Read beak small.

363. The first of the two figures of *L. fragile*, and the figure of *L. marcellense*, have exchanged places.

366, line 10. For coral read dorsal.

370 to 374. As *cheilos*, the Greek word *lip*, is neuter, it is better to write *M. attenuatum*, *fusiforme*, &c., &c.

371, line 5. Keyes says that *M. hamiltonæ* (sic,) does not belong to this group, but may be a *Holopea*. Proc. Acad. Nat. Sc. Phila., 1889, p. 309. — Line 21. Keyes makes this the same as *Naticopsis genevievensis*, M. & W. 1866, and places both in his new genus, as *Sphrærodoma littonana*. — Line 29. *M. macrostoma*, probably a *Holopea*. (Keyes.)

373, line 15. Read *inhabilis*. Keyes reads *inhabile*, and makes this a synonym of his *Sphærodoma primigenia*.

374, line 14. Keyes makes this a synonym of *Sphærodoma brevis*, White.

375, line 34. Erase *XV*. (J. J. S.)

377, line 2. For 109 read 90. — Line 6, read 828. — Line 7, add *XII*. — Line 12. For part 2, read Vol. 3.

378. Insert **Macrostachya infundibuliformis**, Schimper. Large articulate stems longitudinally ribbed like *Calamites* on a subconical surface, with scars of fruiting spike verticillate. Coal Flora, pp. 60, 721, plate 111, fig. 14, reproduced in Collett's Ind. Rt. 1883, plate 4, fig. 7. (Lacoe.)

379, line 8. Fontaine considers this and the following plant, and others given elsewhere, as not of *Triassic* but of *Rhætic* age. — The reference "U. S. Bull, No. 6" on many of the cuts should read "U. S. G. S. Mon. 6." Correct it also on page 380, line 1.

380, line 1. Read for Triassic, Mesozoic. — Line 13. Erase "and fruit."

381, line 4, 5. Read *Upper Cambrian*, *U. C.* (Walcott.) — Line 8, read *Dikelocephalic*.

382, line 7. Read *Upper Cambrian*. (Walcott.) — Line 20. Read *Barren Coal Measures*, *XIV*. (Stevenson.)

385. The figure belongs to *Megalopteris fasciculata* on next page. — Line 19, read *Danæopsis*.

386, 8. Read pinnule. — Insert *M. fasciculata*, Lesq., Coal Flora, p. 150, pl. 24, f. 2. Collett, 1883, pl. 9, f. 2, (given on page 385.)

389. Read **Megaphyton protuberans**. — Line 5, read 458.

390. Insert **Menocephalus salteri** from pp. 416, 417.

397, 12. For *Trias* read *Rhætic*; and for Bull. read Mon. Fontaine would change *Trias* to *Rhætic*, also, on pp. 398, 399, 400. The reference is not to the Bulletins but to the Monographs of the U. S. Geol. Survey.

401, 1. Read **Mesonacis**; and 399.

402. Erase the first two lines; they belong to p. 387.

403, 25. For always read usually. Erase "never seen, &c." For Coldbrook read St. John. "This species has *two* segments in the thorax like an *Agnostus*" (Matthew.) He would also make it (*Microdiscus dawsoni*) *Lower Cambrian*, (p. 404;) and also *M. punctatus* on p. 405.

406. **Modiola angusta.** "There is some great mistake here. Hall has the specimen collected by me within a few feet of the very top of the *Catskill.*" (J. J. S.)

410. *M. subalatus.* Figures upside down.

412. Read *M. alata.* Hall.

416. Read **Menocephalus salteri**, and transfer it to p. 390.

433, 1. Read page 207.

435, 9, 10. Erase Mazon creek and nodules. — Line next bottom, read, Vol. 3, 1884, p. 301, pl. 27, fig. 8 (Lacoe.)

436, 4. Insert: Type in Dr. Scudder's collection; also specimens in the Lacoe, &c. (Lacoe.)

Errata, page i. Read Sir John William Dawson.—Captain A. W. Vogdes.

ii, 7, 32. Read *Adiphlebia lacoana* * * * a hexapod neuropteroid. — *A. singularis*, ditto. — 1885. — 8, 14. Read *Brevifrontes.*

iii, ii, 2. Read Dec. 27, 1888.

v, 29, 7. *A. trilobitus*, was found at Fayetteville, Ark., in *Subconglomerate shales, XI.* — *A. robusta*, a hexapod newropteroid insect.

vi, 31, 6. Read **Archegogryllus** * * * a hexapod (cricket.)

vii, line 4. Read Joggins coal measures N. S.

viii, 52, 33. Read **trilineatus.**

xiii, 125, after 6. Read **Chlænius.** — Read **Cheliphlebia.**

xiv, 135, 40. Read **Cochliodus.**

xv, 141, 32. Transpose lines 20 and 21, so as to make line 21 ("same remark," etc.) follow line 20; and read "nearly as large as this drawing." — 142, 1. "Walcott's and Rominger's observations on the Cambrian faunas of the Rocky Mountain region show a closer relation between the *Middle* and *Upper Cambrian* faunas than has hitherto been known. The Cambrian system is therefore now best divided, as proposed by Dr. Hicks, into two grand sections, *Lower* and *Upper*; this *Upper* including what is called *Middle* in this note." (G. F. Matthew.)

xvi, 149, 36. Read **Dictyo-cordaites.**

xviii, 187, 21. Read **Odontochila**, Laporte, Coleopt. 1834 (Horn.)

xix, 189, 26. "No *Silurian*, no *Devonian* in Park Range, Colorado; but *Carboniferous* absolutely conformable to *Cambrian.*" (J. J. S.). — 192, 1. Read **Danæites**. — 199, after 37. Read **Dictyo.**

xx, 201,40; 202,1. Both are neuropterous insects. (Scud.) xxi, 212,28. The same. — Line 4, read Louis. — Line 49, read figs. 5, 6.

xxii, 220, 12. Scudder also objects; saying that *Scorpion, King-crab*, or *horse shoe*, would be better than *lobster.* — Line 36. Read *Spirocyathias.*

xxiii. *E.* For Gate read Mammoth or E vein. (Lacoe.) — *E. ovalis*, a neuropteroid insect. — 233,13. Read Myriapod. Also p. 177, pl. 12, f. 20.

xxiv, line 1. Read 233,14. Line 2, read, f. A, B. Figs. *C, D*, are Scudder's *E. granosa.*

xxv, 253,33. Read fig. 11. — 253,40. Read Vol. 3. — 254,5. Read **Geraphrynus.** — 261,1. Insert **retiforme**, Hall.

xxvi, 266, 8. Read *III a.* — 272, 8, read 1884.

xxx, 332, 7. Read **parallelum.** — 336, 1, read *Anthracomartus.*

xxxi, 352, 18. *L. fimbriata* and *L. condita* from Utah are not in Lacoe's cabinet, but in the Nat. Mus. Washington, D. C., with many more. (R. D. L.)

Vol. 2, page 440, line 13. Insert: in *Leda clay.*

443, 24 Read **decoratus.** — 25 Read Rogers's.

445, 10. **Discites marcellensis.** (Whitfield.)

448, 16. Read **lacoana.** The first edition of Liddell & Scott's Dict. makes *mylacris* masculine, the last edition makes it feminine. It is certainly not neuter. (Scudder; Claypole.)

449, 1. Read **rotundata.** (Scudder.) — 14. Read **Lescuropteris.** (Lacoe.) **Lesqueropteris.** (Claypole.)

450. "Newberry says the figure of nervation is erroneous; the nerves fork near the base and curve somewhat where they join the mid-rib. In Ohio, the plant is at the base of the Coal measures." *XII.* (Matthews.)

456, 8. Read *dluthoschi.* — 11. Read 1883. — 18. Read Charleston.

458, 3. Read *crenulata.*

459, 2. Read Fil. Foss. — 4 from bottom. Read fruit dots (*sori.*)

464, 31. "Certainly not *Upper Devonian.* This was the age assigned to the flora of which this form is a part when the first examples were found; but Sir Wm. Dawson, when larger collections were made, referred the flora to the *Middle Devonian;* no marine organisms have been found in these beds to conform or disprove the reference." (Matthews.)

466, 1. Synonym, *Odontopteris tenuinervis,* Lesq. C. F. p. 125, pl. 22, figs 2, 3. (Lacoe.)

469, 16. Erase all between 5–42 and 97–16, also 19. (Claypole.)

470, 10. Erase all but 68–4. — 14. Erase 88. (Claypole.)

471, 3. Insert, Bulletin Am. Mus. Nat. Hist. (Whitfield.)

476, 20. Logan considered the "Quebec group" to be not "Potsdam," but of some intermediate age between *Potsdam* and *Trenton.* Now the "Quebec group" is known to extend in age from Lower Cambrian to beds high in the Lower Silurian. See Ells's report of 1889. *Potsdam fossils* are collected from the much higher conglomerates of Quebec and Point Levis. See Walcott's Review of Ells, in Amer. Jour. Sci., Feb., 1890.

478, 5. Shodack Landing, N. Y. *Quebec group.*

479, 2. Now referred by Hall to **Linnarsonia.** (J. W. D.)

480, 2. Read *Middle Cambrian.* (J. F. James.)

480, 11. Read **Obolella polita,** Hall. (Whitfield.)

481, 7. Read *eccentrica.* — 9. Read "is" for "are." Emmons called them *Taconic,* and thought them (l. c. p. 113) older than the *Low. Cambrian* (Walcott) shales of Washington Co., N. Y. But such a guess goes for nothing.

482, 5. Name pre-occupied. Read, therefore, **O. newberryi,** Lesq. Coal Flora, p. 127, 1880. (Lacoe.)

486. The right hand figure belongs to **Phlegethontis serpens.** See p. 635 below.

487, 3. Read C. *laciniata.* — 14. Read 4, 5. — 15. Read *decipiens.* — The figure of **O. subcuneata** is upside down. — 16. Read **Oestocephalus.** (Cope.)

490, 11. Read Lower Cambrian. (Matthew.)

493, 23. Read Hall and Whitfield.

494, 8. *Platyceras* growing on *Ollacrinus.* (Greene.)

495, 3. For *Salina* read *Niagara.* (Claypole.) But H. D. Rogers did not recognize the *Niagara* beds in the middle Pennsylvania. — The two small figures (*b*) represent shagreen scales of *Thelodus parvidens*, Ag. The four figures (*c*) were formerly *Plectrodus mirabilis*, Ag. but are now known as *Eukeraspis pustulifera*, Ag. (allied to Cephalaspis.) (Claypole.)

502, 11. Read L. C. (Matthew)—**O. excentrica, O. parmulata,** and the two lower figures of Rogers and Emmons are all four **Discina.** (Whitfield). See note 481, 7, above. The figure from Rogers "looks like the basal epitheca of some species of *Monticulipora.*" (Jos. F. James.)

503, 13. Read **Oryctoblattina,** and transfer to p. 569 below. (Scudder.)

506, 27. Read **gaudryi.** (Claypole.)

509, 5. Read **biforata.**

510, 22. In Band *c* of Division 1. (Matthew.) — 30. Insert Dalman. (Claypole.)

513, 1. Probably **Strephodonta demissa.** (Whitfield.) — 30. No connection whatever with O. *michelini.* (G. K. Greene.)

519, 10, 11. Erase 57–35, and 64–4. — 35, 36. This specimen should be re-examined. (Claypole.)

521, 1. *Streptorhynchus umbraculum.* (Collett.) — 24. *O. lenticularis.* Name preoccupied by Dalman for a Cambrian species. (Matthew.)

523, 4. Read *Delthyris.* — 13. Read *biforata.*

524, 1. Read *michelini.* (Same on p. 529, 13.)

526, 21. Collett thinks this *O. carbonaria.* Read **pecosi**, Marcou. (Claypole.)

531, 1. For Hall read Meek.—18. Read **Porambonites punctostriata,** the only American species of this genus known. (R. P. Whitfield.)

532, 7. Read Hawesville. — 9. Read **retrorsa.** Same as *O. carleyi.* (Whitfield.)

533, 1. *O. sinuata* = *O. occidentalis*, Hall. (Whitfield.)

536, 13. " And this one is a Lamellibranchiate." (Whitfield.

537, 21. For Perry read Mifflin Co. (Claypole.)

538, bottom line. "Identification of *Tully limestone* doubtful." (Claypole.)

541, *O. anceps.* Figure that of a *Gonioceras.* (Whitfield.)

544, 15. Read *O. anceps.*

547, 9. Erase *IX.* "This is not the *IX* of Rogers. It is *Chemung* [*VIII g*] everywhere in the whole Appalachian basin except in N. E. Pennsyvania (Pike Co.) and adjacent part of New York. It carries a distinctly *Chemung* fauna in Virginia, Maryland, Pennsylvania and New York *everywhere* except in the little area of a few hundred square miles. I have followed it out everywhere. It is not the *IX* of Bedford and Fulton." (J. J. Stevenson.)

550. Figure. "This is only the outer portion of *Cyrtoceras eugium*, Hall. (Whitfield.)

555, 7. Now in the Mus. Com. Zool. Cambridge, Mass.

562, 6. Erase "or *Salina.*" (Claypole.)

563, 17. Read *Orthonoto.*

565, 26. Read *Lowest coal measures*, just over *XII.*

566, next to bottom line. Read *obseletum.* (E. W. C.)

567, 22. Read **parallelum.** (E. W. C.)

568, 24. Read *conicum.* (E. W. C.)

569, 17. Insert *Oryctoblattina* from p. 503. — 18. Read *Ostracods.*

571, 35 ; 572, 2 ; 573, 1. Read C. H. Hitchcock.

574, 11, 12. Claypole reads *quadrispinosa*, and *P. cuneata*, — 18. Insert "a protozoon."—19. The doubt is explained thus: "This is a distorted example. The shell is oval in outline, and the apex at the *posterior* third; its relation to *Acmæa* is therefore doubtful." (Matt.) —23. Insert "Division 1." (Matt.)

578, 9. Read "ventral." — 24. Read *Matthevia.*

580, 1. Insert "**Palæoctonus appalachianus**, Cope. Proc. Amer. Phil. Soc. Philada. 1877, page 182. A gigantic carniverous Dinosaur, bones of which were found in the red sandstone of York Co., Pa. *Trias.* — 8. Erase "-8." *P. barrisi* was *not* found in *L. Held. shales*, at Montebello, or elsewhere; but in the *King's Mill series of the Chemung-Catskill transition group* (which Stevenson, however, considers pure *Chemung.*) In printing Cat. OOO, S. 49 (L. Held.) and S. 50 (Chemung-Cattskill) were confused. (E. W. C.)

581, 9. Erase 23. — 11, 12. Erase "opposite Newport" etc. to "*Chemung.*" (E. W. C.) — 27. Read Barnett's mill.

582, 23, 24. Erase 33, and 24, 26. (E. W. C.)

583, 29. Read Comp's mill. — 34. For *Oriskany?* read *Hamilton, VIII c.* (E. W. C.)

584, 27. Insert — *X* — *XI.* (Matthew.)

586. *P. beverlyensis*, Billings. (J. W. D.)

587. Claypole would read P. gracile; P. irregulare; P. tubulare (p. 588.) — Read **Palæophycus milleri.** It is a good species. *P. gracilis* (*gracile*) may be a variety of it. Coal Flora, p. 10, pl. A, fig. 8. (Lacoe.) — *P. tubularis* (*tubulare*) "probably worm burrows" (J. F. James.) — *P. irregularis* (*irregulare*) fig. on p. 589, "most likely of inorganic origin." (J. F. J).

589, 31. Read Van Cleve.

590, 1. Insert **Palæosaurus fraserianus**, Cope. Proc. A. P. S. Philada., 1877, p. 232. A probable Parasuchian crocodile, from York Co., Pa. *Trias.*

491, 13. "A species not to be distinguished from this (*P. maculata*) occurs in the *Cincinnati group* (*Hudson river, III b*), of Iowa. (Jos. F. James.)

595, 6. Read *Platynotus boltoni*, and transfer it to p. 691. — 15. Read **Paola.** Also on 596, 2. (Collett.) But S. A. Miller reads it as it stands.

596, 597. G. K. Greene prefers *Upper Helderburg* to *Corniferous limestone;* and on line 14, for (Corniferous) would read (Middle Devonian.) This may do in the west, but would be almost absurd in Pennsylvania.

597, 7. See page 215, Vol. 1. (Matthew.)

598, 16. There are no Paradoxides in the fauna of Mt. Stevens. —26. For "Portland?" read "Band *c* of Division 1, St. John." Add: "A small species distinguished from others which occur with it by its thick granulated test." (Matthew.)

599, 15. For 2, read 1 *a.* Compare with tail of *P. rugulosus* on p. 602. (Matt.)

600. *P. Kjerulfi*, "as described by Gerard Holm is a form of *Mesonacis*, Walcott. (Matthew.)

601, 9. Insert "Div. 1 *c.* Portland (now St. John)." (Matthew, who objects to Walcott's Middle Cambrian horizon of Paradoxides, on this and next page.)

602, 19. Read **Paromylacris rotunda,** and transfer it to p. 603. (Scudder.)

603, 7. *Patella*, Linn. is not a Palæozoic genus (S. A. M.) for Linnæus substitute White. (Claypole.) — Line 1. *P. nyops* is from the *Trias* of N. Carolina. (Cope.)

604, 8. **Erase "identical with." "No other name has been given it, though recognized by Schimper and others as a good species. Coal Flora, pp. 264, 265." (Lacoe.)**

606, 5. White's reference is to *P. inflata*, Newby. inedited. (Lacoe.) —7. Read "? (Brongt.) Lesq. in Coal Flora." (Lacoe.)

607, 2. Read **muricata.** —9. Synonym of *Pseudopecopteris nervosa*, Lesq. Coal Flora, p. 197, pl. 32, figs. 1-3. (Lacoe.)

608, 9. Name preoccupied by a palæozoic species of Fontaine and White, in Report PP, p. 71, pl. 20. (Lacoe.)

609, 3. Insert: "but not *N. serrulata*, Daws. Foss. Plants Dev. & U. Sil. form. Can. (1871) p. 49, pl. 18, f. 213; Q. J. G. S. 18, pl. 15, f. 35. (Lacoe.)

610, 2. For *Alethopteris* read *Pecopteris erosa.* (Lacoe.) — 18. *P. truncata.* Name changed to **P. quadratifolia,** when published, Coal Flora, p. 234, and MS. Index of Species. (Lacoe.)

614, bottom. Read *Lower Cambrian. L. C.* (Matthew.)

616, 1. The figure belongs to Hall's genus *Gypidia* [*Gypidula*, S. A. M.] (Whitfield.) —Thus, p. 618, *P. occidentalis*, is now **Gypidula occidentalis,** Hall. Geol. Iowa, I, ii, p. 514.

617, 8. At Richmond, Ind., individual shells occur as wide as they are long and of relatively small convexity. (Collett.) Very abundant in the *Niagara* of southern Ohio. (J. F. James.)

618, 3. *Guelph*, top member of *Niagara.* Reports of Orton, Winchell, etc. (J. F. J.)

619, 22. Read **conoideus.**

620, 2. Insert Philadelphia. —17. Read radial. — 18. Read folds. —Figures 2 *b*, *c*, are **Troostocrinus woodmani,** M. & W. Geol. Illinois, Vol. 5. (Whitfield.) — *P. obesus*, in the west, occurs only in the *Kaskaskia* (*Upper Chester*) *limestone;* never in the overlying *Millstone grit.* (Collett.)

622, 1. Read *Codonites.* —7. Read **subsylindricus.** (E. W. C.) — 12. Rogers' figure is either *P. sulcatus*, or *P. godoni.* (Whitfield.) *P. godoni.* (Collett.)

623, 1. Fig. 4 is of **Ceraterpeton punctolineatum, [lineopunctatum,** S. A. M.] Cope. Pal. Ohio, Vol. 1875, p. 372. *XIII.* (Orton.)

625, 7. Read *alleghaniensis.*

626. Read **distortum, pseudosagittatum, spatulatum, striatum.** — 31. Read hexapod. (E. W. C.)

627, 1. Read **meieri.** (Scudder.) —The figures for *P. canadensis* and *calicula*, are not *Petraia*, but *Zaphrentis.* (Whitfield.) S. A. Miller and others style them *Streptelasma.* (Collett.)

629, 5, etc. "Doubtful if these are anything more than a variety of *Phacops rana.* E. W. C. —39. Read crenulations.

631, 16. Read *fecunda.* —30. Read *Henzell's.*

632, 10. For Worthen, read Whitfield. —20. Read **Phillipsastræa.** — 31. Read *insignis.*

633, 10. Read *maccoyi.* — Read Mo. for Miss. — 22. Read (*Griffithides?*) and the same on page 634, line 4.

635, 8. The figure is *Oestocephalus remex*, Cope. (Orton.) — 13. Read tendinous. — 14. Read *vertebral.* Also 486.

636, 15, 16, 17. Erase all after "See." (E. W. C.) — 34. Read *P. ovata.*

637, 3. Read **hamiltoniæ.** — 15. Insert **Pholidops ovata,** found at Clark's mills, Perry Co., Pa. (E. W. C.)

638, 5. Read **Phragmostoma natator.** This *gasteropod* shell is from the

Trenton of Tennessee. *II c.* "Mistake made by change of name in 15th Report State Cab. N. Y." (Whitfield.)

639, 10. **Phthanocoris.** * * * A hemipterous insect, etc., Vol. 22.

640, 1. The two upper figures only are *P. typus.* The threee marked p. 507 (middle and left hand) are *Diplograptus whitfieldi.* (Whitfield.).

644, 2. Read Vol. 6. — 16. Read *marginatum*, and erase Europe. — 19. Read *P. tessellatus.*

647, 27. Read plate 111.

649, 12. Read **ramosissima.** — 22. Read Whitfield.

650, 1. See **Piloceras amplum**, Dawson. Canadian Naturalist.

652, 1. Read **Planctichnus**, and transfer to p. 651.

654, 24. Many forms described as plants are now undoubtingly accepted as inorganic (rain rills, burrows, etc.). Such described "fucoids," for example, as *Aristophycus*, Miller and Dyer, have been repudiated by their authors. (J. F. James.)

655. Figure 40 represents *Psilophyton princeps*, Dawson. See 16th Report N. Y. State Cab. p. 111 (Whitfield.) — Fig. 38 is *Lepidodendron gaspianum*, Dawson. (Whitfield; also Dawson.) — Fig. 46 is *Ptilophyton vanuxemi*, Dawson. (Dawson.) It is *Plumulina plumularia*, Hall. (Whitfield.) *Plumulina plumosa.* (E. W. C.)

656, 21. Read *Lingula ligea.* (E. W. C.) —23. Read p. 191.

657, Fig. 58 is an *Archæopteris* (Dawson.) It is *Cyclopteris jacksoni.* (Whitfield.) — Fig. 56 is the stipe of a fern. (Dawson). It is *Rhachiopteris punctata*, Daws. (Whitfield.) — Fig. 55 is *Lepidodendron gaspianum*, Daws. (Dawson; Whitfield.) — Fig. 57 is *Rachiopteris pinnata*, Daws. (Whitfield.)

659, 10. Figure is *Spirophyton crassum*, Hall. (Whitfield.) See *Taonurus.* (Collett.) — 10, 11. For "a fern * * * measures," read "*Fucoides cauda-galli*, Geo. Pa. 1888, plate 21, f. 1, p. 826, from the *U. Held. lime shale* near Delaware Water Gap, Pa.—*VI.*

660, 16. Read **Rhacophyllum.** —33. Read *striatus.* — 35. Read *filiculme.*

661, 8. Read *pinnæformis.*

661, 10. Read "*pluckeneti*, var. *constricta*, F. and W." —15. Read *merianopteroides.* — 24. Read *speciosissimum.*" — 27. Read *bicarpus.* — 28. Read **Guilielmus.** (Lacoe.)

663. Original figure of *P. antiqua* is in Dawson's Acadian Geology. (Scudder.) Erase *IX? & IX.* (Matthew.)

664, 29. Read *dumosum*, a figure of which is given on page 682. — 32. Erase 5-75, &c. (E. W. C.)

665, 23. Read *Platyceras.* — 26. Read *mitelliforme.*

666, 3. Read Keyes.

669, 33. Read *cymbium.*

671, 5. Read ***Oriskany sandstone*** of Cumberland, Md. (Whitfield.) — 7. Read 95-2.

675, 9. Read *pentalobatum.* (E. W. C.)

684, 27. Erase from "200-1" to "Co." These specs. are *Platystoma.* (E. W. C.)

686, 16. Read spinose. — 20. Read *lodiensis.* (E. W. C.)

688, 14. Read **lodiensis.**

691, 14. Read Dr. Newberry. —20. Read **dubium.** —26. Read *tumidum.*

695, 30 and 34. Read *niagarense.*

696, 26. Add, Claypole's spec. 200-4 from Mapleton, Hunt. Co., Pa. (E. W. C.)

697, 698, 699. For Icht. & Ichthy, read Ichnology.

699, next to last line. Read *Mytilarca.*

700, 2. Read **Plethomytilus.** — 20. Read stiletto.

703, 1. Figure 1 represents a species of *Ptyonius*, Cope. (Orton.)

705, 12. Add, Abundant also near Cincinnati. (E. W. C.) — 18. Read **Raphistoma.** (Whitfield.) — 25. The middle figure is a *Scalites.* (Whitfield.)

706, 6. Erase 3 and 42. — 7. Read 118-25. — 8. Read township.

707. Figure under *P. docens*, is a *Scalites.* (Whitfield.) — Line 10. Read *primum.* (E. W. C.)

711. Figure of *P. laurentina* (*d*) is a *Raphistoma.* The same is true of *P. progne*, p. 714; and *P. rotuloides*, p. 715; also of *P. subtilistriata* (fig. 12) p. 717; and Emmons' figure 1, on p. 721. (Whitfield.) — Line 19. Read **leavenworthanum.** — 21. Read **lenticulare.**

715, 12. Read **solarioides.** (E. W. C.)

718, 38. Read White & Whitfield's *P. mississipiensis*, which it certainly is. (Whitfield.)

719, 7. Read *leavenworthanum.* (E. W. C.)

720, 13. Figure 9, a *Holopea.* (Whitfield.) H. D. Rogers assigns it to the *Auroral*, and therefore *Calciferous.* (E. W. C.) — 28. Read Holopea. — 31. "Wrongly identified. *P. unisulcata* is a *Platystoma* and comes from *U. Held. limestone VIIIa.* (Whitfield.)

722, 1. Read *Pleurotomarias.* — 11. Read *misera.* (E. W. C.) — 40. Erase 13. (E. W. C.)

723, bottom line. Insert: "and in strata of *Cincinnati* [*Hudson River*] age on Little Magusketa river, Iowa. Fragments referred to this genus are noted by Walcott in Geology of the Eureka District, Nevada. Should not the genus be rather *Turrilepas?*" (J. F. James.) — 19. Read *gracilimus.* (E. W. C.)

724, 3. For Trilobites read Crustaceans.

727, 17. Read **cestrensis.** (E. W. C.)

728, 16. Read **varsovensis.** (E. W. C.)

730, 6. Read Ichnology of New England.—8. Read hind foot.

731, 7. Read *fusiforme.* (E. W. C.) — 16. Read *nitidulum.*

732, 2. For "two orders" read rather "two sub-classes. The families are more numerous than those given in the text. *Monticuliporidæ* is an important family of sub-class ALCYONARIA. The *Graptolitidæ* are considered as HYDROZOA by most naturalists, this being a class of equal rank with ANTHOZOA, the two with *Ctenophora* forming the **Coelenterata.** (See Encycl. Brittan. 9th Ed. Vol. VI.) (Jos. F. James.)

634, 1. Read **piasensis.** — 7. Read Piasa creek. (E. W. C.)

735, 13. Insert: foraminiferous organism.

736, 7. For **Porites** read **Astrocerium venustum**, Hall. And for **Porites** on p. 737 read **Stromatopora concentrica**, Goldf. (Whitfield.)

739, 6. Read **casei.** (J. F. James.) — 22. Read *Palæocrinus.*

742, 1. This species has been since referred to Cope's genus *Lagomys.* (Upton). — Bottom. Read gnawed.

743. *P. cristata*, *P. gregaria*, and *P. seelyi*, (p. 744) are called *Isochilina* by T. R. Jones.

747, 24. Read *Chemungense.*

748, 14. Read *exanthema.* (E. W. C).

749, 23. Erase -3. -24. Erase 6 - 8. —25. Erase 4. —26. Read Losh. — 29. Read 80-1, 80-6. —31. Read 80-6. (E. W. C).

751, 16. Read 69—3. (E. W. C.)

757, 12. Owen's figure looks more like *P. semireticulatus*. (Dawson.) — 6. Read **cestrensis**. (E. W. C.)

758, 18. This is not **P. cora**, of D'Orbigny. Many specimens of *P. cora* of Indiana were determined and labelled in d'Orbigny's hand, in our University Museum, Bloomington, Ind. (Collett.)

759, near bottom. Read **cestrensis**. (E. W. C).

760, 14. Read **longispinus**.

761, 15. Read *crinoidal*.

762, 8. Read **prattenanus**.

763, 2. Erase "Van Cleve's." On figure, for 1881, read 1883. (Collet.) — Bottom line. Read **semipunctatus**. (E. W. C.)

767,28. Read **alaricus**. — Read *Catskill* everywhere.

770, 17, 18, 19, Erase from "and" to "*a*." (E. W. C.) — 34. For [?] read 6. —35. For *d* read *b*.

772, 24. Read **P. ovalis**. —26. Read **Propteticus**.

774, 3. Read *Eurypterus*. — 25 and 37. Read **Protaraea**. (E. W. C.)

775,11. **Protaxites** = *Nemotophyton*. (Dawson.) Read **Prototaxites** and to page 783. — 17. Read medullary.

777, 23. "*Limulus* does not move sideways." (E. W. C.) —36. Read cardinal. (E. W. C.)

778, 4. Read opercular plates. —6. Read *limitare*.

783, 5. Read **Protostigma sigillarioides**. —Read **Protypus hitchcocki**. (M.)

784, 1. Read **Prototypus**.

788, 4. Read fossiles. — 16. Read **rhomboideus**.

790, 12. Read Joggins.

791, 1. Read Zittel's.

795, 7. Read Vol. 6, 1883.

796, 23. Read **Cordato-ovata**.

799, 12. Read Mr. Lacoe. —33, 34, 35, 36. Erase all from "Lesquereux" to "Devonian." On p. 830 of C. Fl. Lesquereux quotes Dawson's remarks on *Cyc. valida* "similar in all its characters to *Sph. macilenta*, Ll. & H. from which it differs by essential characters, and then adds in parenthesis "not mentioned." (Lacoe.) — 6 from bottom. But "these figures differ from the type of *C. valida* in the collection of the Natural History Society of St. John, N. B. in their smaller size, differing pinnules, and venation and general port." (Matthew, June 1890.)

805, bottom, fig. 426. "This is an error corrected in my Report of 1871. The fructification is in pendant sporocarps. See fig. in Report, and Geol. Hist. of Plants." (Dawson.) — **P. gracillimum** is probably a Graptolite, a species of *Dendrograptus*. (J. F. James.)

806. **Pteraspis** is not known below the Devonian. **Scaphaspis** alone descends to Silurian. (E. W. C.)

807, 4. Read **Acanthichnus**. — Fig. 1. Read *Copeya;* also line 13. Other forms are *C. punctata*, Hitchc. suppl. Ichn. N. E. pl. 6, F. 14, pl. 18, f. 1, —*C. cruscularis*, item, no figure. —*triremis*, item, pl. 31, f. 4. Three or four other species of *Bifurculipes* might be added; but one example suffices. — Line 9. Read Ichnology N. E.

808, 3. Read **rugosus**. Another large plate of the same species has been found, but is not described, (E. W. C. May, 1890.)

809, 4. Read *pectiniformis*.

812, 9. Read **Ambonychia.**

813,40. For "family" read "genus." **Pterodactylus is a genus of the** family of *Ornithosaurians*, bird-lizards. Prof. O. C. Marsh describes bones from the *Neobrara yellow chalk* of Kansas, to which he gave the name (Amer. Jour. Sci. June, 1871). Prof. E. D. Cope in describing similar remains from the same *Cretaceous* deposits along Butte creek, Kansas, rejects Marsh's name as preoccupied, and describes his own specimens under the names **Ornithochirus** (Seeley, *bird-hand*) **umbrosus**, and **O. harpyia**: The latter about the size of Marsh's species; the former "the largest *Pterodactyle* as yet known found on our coCtineet." Cuvier's genus *Pterodactylus* is chiefly known from *Iurassic* strata. — (Proc. Amer. Philos. Soc. Philad., p. 420, March 1, 1872).

818, 1. Compare with *Pterinea longispina.* (J. F. James,)

823, last line. Read "by J. J. Stevenson; see Claypole," etc.

824, 1. Read Ichnology, N. E. — 9. Read Buckland.

825, 13. Orton makes the *Dayton limestone* the basal member of the *Niagara* in Ohio, underlying the *Niagara shales.* But it is only a local formation. (J. F. James.)

829, 24. Read **miniscensis.** (E. W. C.)

830, 4. Read **speciosa.** (E. W. C).

831, 24. Read **emmerichi.** — Next to last line. Read *piochensis.* (E. W. C.)

832, 3. Read *Crepicephalus*, Owen. — 6, 11. After *haguei* and *iowensis* insert Hall. — Bottom line. "The St. John group is *Middle* and not *Lower* Cambrian." (J. F. James, who would also change *Lower* to Middle in the cases of *P. orestes* var. *thersites*, *P. quadrata*, *P. tener*, on pp. 833, 834, 835.) — Line 17. Read **misera**, (E. W. C.) — Bottom line. Read *orestes.*

833, 1. Read **Solenopleura robbii, var. thersites.** (Matthew.) —7. **Read Liostracus onangondianus.** "It differs from *Ptychoparia* in having no genal spines, &c." (Matthew. June, 1890.) — **P. quadrata** is the "young of another species, *Liostracus onangondianus.*" (Matthew.) — **P. robbi is** a "*Solenopleura* by its inflated cheek, granulated surface, and rounded ends of pleura." (Matthew.)

833, 4. Read *thersites.* — 26. Read Hall and Whitfield. — 27. Read *quadratus.* (E. W. C.)

834, 29. Read **tenera.** (E. W. C.) Read *L. tener.* (M.)

835, 15. "If a *blind* trilobite, it is not a *Ptychoparia.*" (Matthew.)

835, 17. For *Hudson River* read *Utica slate.* (E. W. C.)

836, 1. Read *Conocephalites.*

837, bottom line. Read Crab Orchard.